Amateur Radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

VOL 54, No 10, OCTOBER 1986

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1986 REMEMBRANCE DAY ADDRESS
ANTENNA ARRAYS Conclusion
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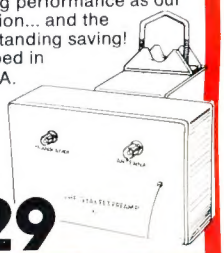

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Looking from Direction Island to West Island across the lagoon on Cocos (Keeling) Islands. (See story, How's DX column).
Photograph courtesy Neil Penfold VK6NE

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JAS-1, the Japanese Amateur Satellite was eventually successfully launched, a few days late, on August 12. In the AMSAT column this month, Colin VK5HI, gives all the technical descriptions and appropriate formulae for the operation of JAS-1. (see page 51).

And as JAS-1 soars aloft, Joe VK4AGL, takes us back to the start of the satellite generation, Sputnik One. (Page 26).

As promised last month, Drew VK3XU, presents (page 16), the full construction details and circuit diagrams and PCB design for an 80 metre Direct Conversion Receiver.

Each year, prior to the beginning of the Remembrance Day Contest, a notable personality delivers an opening speech. This year, the guest speaker was Sir Mark Oliphant, a well-known Australian. Sir Mark has held many important posts around the world including the position of Governor of South Australia. Ron VK3OM, has painstakingly transcribed Sir Mark's speech from tape and Ken VK3AH, researched and wrote a small insight into his life. (See page 28).

Peter VK3KAU, is searching for more material for another cassette tape following on from the great success of Volume 1. Peter is particularly interested in recordings of contacts on the former amateur bands, such as 112 and 288 MHz, etc. See page 57 for full information.

The International Radiosport Association is an independent international organisation dedicated to the promotion of quality and sportsmanship in amateur radio. This month they are conducting their first Championship Contest, the rules of which are published in the Contest Column. They also feature several awards. See page 48 for a description of the Association and details of some of their awards.

Interested in propagation on two metres. An article, originally from *Electron* and translated by John VK4QA, for AR, describes some interesting experiments which are being carried out in Europe. Field Aligned Irregularity uses similar reflecting or bending mediums to Sporadic E. This may be "food for thought" for the VHFer (see page 24).

Don't forget JOTA, this month. And, if you participate, a short story and some pictures would be appreciated.

BKP

DEADLINE

All copy for inclusion in the December 1986 issue of Amateur Radio, including regular columns and Hamads, must arrive at PO Box 300, Caulfield South, Vic. 3162, at the latest, by 9am, 20th October 1986.

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HAMADS should be sent direct to the same address, by the same date.

Acknowledgment may not be made unless specifically requested. All important items should be sent by Certified Mail. The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying a reason.

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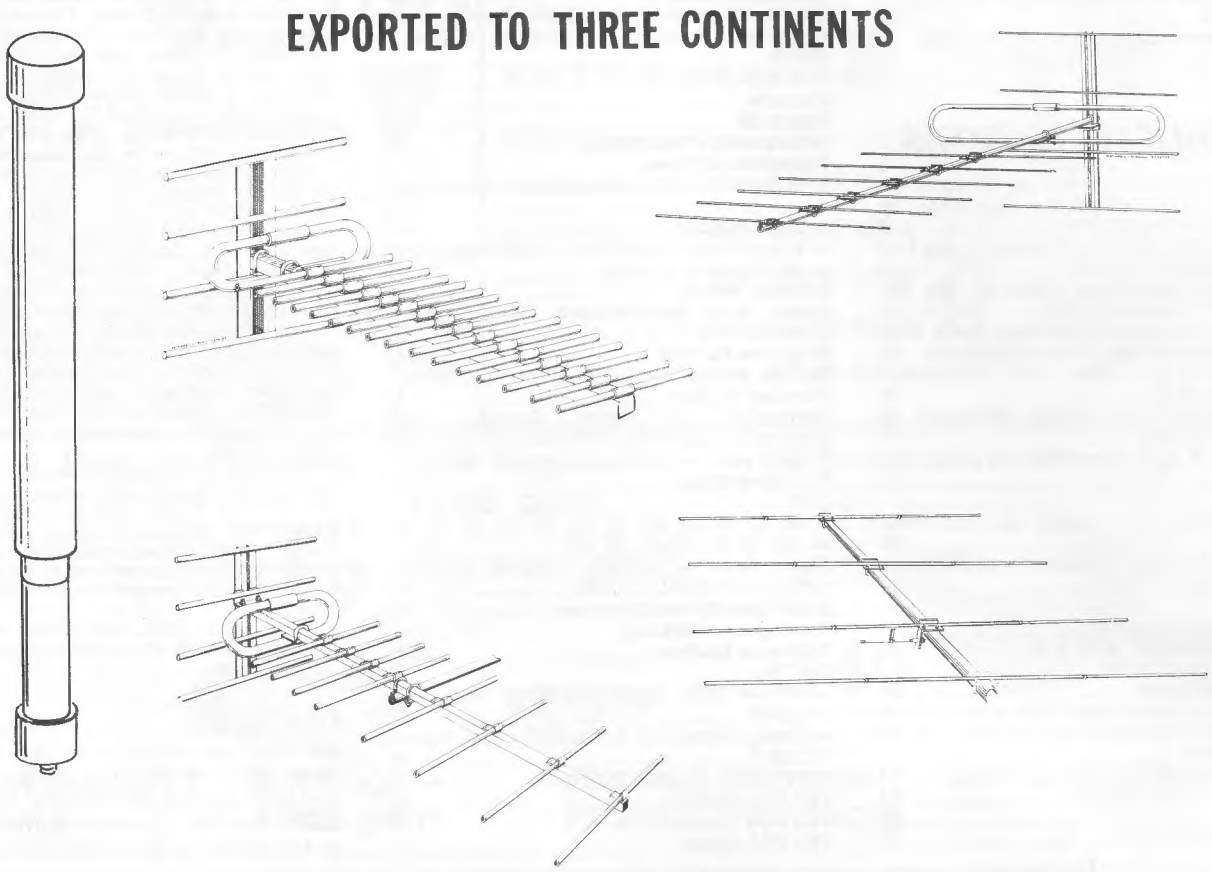

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STORES ACROSS AUSTRALIA AND NEW ZEALAND

Editor's Comment

THIS MAY CONCERN YOU!

Two matters of some importance have surfaced via our mailbox in the last few weeks. The first relates to a frequently recurring problem with this magazine. Once again we have almost run out of technical articles. Not material in general; our regular columnists usually manage to put together enough about contests, satellites, DX, awards or whatever to fill their allocated space each month. But you, the readers, have always made it clear that what you want in each issue of AR is a good quota of technical information; and we all prefer it to be written by our own members rather than reprinted from overseas journals.

Unfortunately the supply has nearly dried up! The bottom of the proverbial barrel stares us in the face! (Your Editor has always had a weakness for well-mixed metaphors!) Where are all our technical authors? Probably, like the rest of us, they are so involved with making a living and keeping up with today's inescapable mass of paperwork that they don't even have time to get on the air, let alone build a new whiz-bang gizmo, *let alone* write a story about it.

Maybe though, some of you have a story to tell — and time to tell it — but just don't quite know how. A letter arrived recently from one such enthusiast. His query was "How should I prepare an article on Topic X? What form of presentation is required?". Could there be others, similarly bursting with interesting technical material, who only need a few clues to set them writing? Rather than just replying to one, it now seems a good idea to address it to you all.

First, we're not really all that fussy! We're so glad to get something we can use that we don't mind having to do an hour or two of editorial work to "lick it into shape". On the other hand, the less editing it needs the sooner you will see it in print. First, we must be able to read it. So, if possible, please type it, unless your handwriting is very very good. Please, please, double space the lines, unless you *know* your ability at technical journalism is so great that no editor could possibly want to change a single word! Those spaces are where all the editorial changes have to be written in.

It helps to keep things tidy if you use standard A4 size paper (30 x 21 cm, or for old-timers, 11½ x 8 inches approximately). Leave a good wide margin at the left, at least 3 cm. Please *don't* write it all in block capitals, either by hand or on your old teleprinter! Use upper and lower case, just as it will be printed.

If there are drawings, diagrams, circuits, board layouts etc (and without some of those it will hardly be technical!) you have two choices. If you are a skilled draftsperson you will do it yourself (on A4 sheets). If not, send us readable sketches and leave it to us.

We do like photographs. Black and white for preference, but even colour slides can be used if they are in sharp focus and have good contrast. But photocopies of all material are a no-no! They usually have little blemishes, streaks, spots or whatever, just where they will produce maximum confusion. Murphy loves photocopiers!

Has that triggered you off? Good. We are waiting for your first article. It might even win a Technical Award. Go to it!

Second topic. Third Party Traffic. Without pointing any fingers, various activities have become popular since third-party traffic was added to our privileges. Sometimes these involve not only our own friends and neighbours but also non-technical members of the general public. Another member wrote recently to point out that while handling unimportant non-commercial traffic for third parties is permitted, soliciting for it is NOT. We had so far seen no such prohibition in any of the new regulations, and replied to this effect. The response was a photocopy of a letter from DOC in reply to his query as to what is permissible. It states specifically *"Amateur stations are therefore not permitted to solicit for messages on behalf of the general public"*. It was written some years ago, obviously after third-party was approved, but before the new Act became effective. It probably still applies. It might be best to assume that it does, until the new Amateur Handbook (still in preparation) removes all doubt. Need I say more?

A brief admission. I was wrong in July, when I wrote that television broadcasting began from the Crystal Palace 50 years ago. Only a week or two later, I found from an authoritative journal that it was the Alexandra Palace. Too late, it was in print! At least one eagle-eyed reader spotted the error. Dave VK3ZXU wrote in, not only to point out the error, but also sending some 1936 magazine items about the event. You will find them in this issue. Thanks Dave! 73

Bill Rice VK3ABP
Editor

Write an Article for AMATEUR RADIO!

Ian J. Truscott's ELECTRONIC WORLD

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AR86

ANTENNA ARRAYS

Part 3 — Installation and Use

Paul McMahon VK3DIP
47 Park Avenue, Wattle Glen, Vic. 3096

In order to help those installing this program on their system, an example of a simple three element Yagi will be considered.

The data for this example is presented below:

Number of elements = 3
Frequency of interest (MHz) = 300
ELEMENT NO 1
Diameter = 0.002, Length = 0.475
ELEMENT NO 2
Volts in = 0 , 0
Position angle = 180, Displacement = 0.1
Diameter = 0.002, Length = 0.5
Series resistance = 0
ELEMENT NO 3
Volts in = 0 , 0
Position angle = 0, Displacement = 0.15
Diameter = 0.002, Length = 0.45
Series resistance = 0

Some of these items may require further explanation. The Frequency, in this case chosen to be 300 MHz so that length in metres equals length in electrical wave-lengths, is the frequency in megahertz that the array will be analysed at.

Element number one is the reference element, it is usually the driven element in an array. In this program it will be initially assumed that this is the case, although if need be, later on using the alter option, this can be changed.

Subsequent elements to one can be driven or only parasitically excited. The way this is accomplished in this program is via the "Volts in" parameter. If, as in this example, parasitic only elements are required then their feed point voltage should be chosen to be 0 , 0.

If, for example however, an element was fed, by coaxial cable or other means, so as to be, say 90 degrees out of phase with the reference element, but at the same level, then 1 , 90 would be the appropriate response. Element two in this case is the reflector so, when its position is specified, it has an angle of 180 degrees to the reference. For this input, zero degrees is straight ahead, 180 degrees is behind, 90 degrees is above and 270 is below, with, of course, all points in between in the usual places. The displacement then in this simple case, becomes the element spacings. In more complex cases it must always be remembered that the displacement is with respect to element number one and not the next closest element.

This program also can allow for series resistance in the elements. This is useful for seeing the effect of non-ideal elements, or for other purposes which will be discussed later. In most cases, this will be zero. Element three in this case is the director and is thus located in front of the drive element.

The results from this array are given below:

Currents	
Element 1	*1 +JO*
Element 2	*-0.284 + JO.234*
Element 3	*-0.46 - JO.628*
Impedances	
Element 1	*9.5 - J25.7*
Element 2	*0 + JO*
Element 3	*0 + JO*
Gain	*7.8 dBi*
f/B	*18.2 dB*

The impedances for elements two and three are, of course, zero because they were chosen to be parasitic elements. If desired the length of element one could be changed by small amounts until its impedance was solely real; ie it was resonant. This process does, however, take quite some time as it is necessary to re-calculate the entire array after each change.

See the Appendix for more detail on intermediate values, etc.

VALIDATION OF THE PROGRAM

While, as I have said, this program for all its mathematical complexity, in only a model or approximation to the real world. It is always of some interest to compare the results obtained with those obtained experimentally or theoretically by other methods. The program as it stands will only accept up to 10 elements, though this is only limited by the dimension statement which can, of course, be changed. With this in mind, the available literature was searched to find results that could be comparable. One source was eventually chosen. While it may seem difficult to believe that only one was available it must be noted that the vast majority of amateur literature does not usually inspire with its absolute accuracy or test methods. In fact, even when dB figures are claimed for gain as being measured, it is rare that the reference is given; ie dB isotropic or dipole, etc.

The chosen work is Reference 3 (b). In this article, James Lawson gives a good comparison table when he is validating his model against the NBS* Yagi data. Part of this along with the results from the model developed here are given in Table 1. (* National Bureau of Standards (US)).

Table 1. (Partially from Reference 3 (b) with additions).

Antenna Gains in dBi

NBS Yagi Type	NBS Measured	Half Power Beamwidth	Pattern Integration	Lawsons Model	This Model
2 elements	4.77	7.50	6.71	6.70	7.28
3 element	9.25	10.02	9.62	9.16	8.93
5 elements	11.35	11.86	11.41	10.73	10.33
6 elements	12.35	13.90	12.64	11.80	10.77

As can be seen there is reasonable agreement between the results obtained using this model and other methods. This is particularly gratifying when consideration is given to the assumptions and limitations of the model developed here. The worst deviation appears to be with the six element design, but even this represents only some eight percent error. This difference is probably due to the accumulation of errors, as the amount of processing goes up greater than geometrically with increasing numbers of elements. What the above does indicate however, is that the model will be useful in predicting antenna performance without or/before building it.

ASSUMPTIONS AND LIMITATIONS

It is vital for any user of this model/program to understand at least in part the limitations and assumptions on which it is based. These factors will determine where, when, and on what analysis can be done successfully.

Firstly, the array as analysed is in free space; ie not above a real ground. This means that antenna performance in a real situation that is not a considerable distance above ground, will not perform in exactly the same way as predicted by this model. This will not usually be too much of a problem as the major effects will be to raise the angle of maximum gain, plus to modify the input impedances.

Secondly, the array does not have a metallic boom or other support. Metallic structures like booms will have definite effects on performance. Lawson in Reference 3 (c) discusses this and the first limitation and shows how this can be overcome. Once again this should not greatly affect the usefulness of this program.

Thirdly, there are limitations imposed by the micro-computer and version of basic that the model is run on. Most owners of micro-computers are reasonably aware of their machines limitations in speed and accuracy.

Fourthly, the gain routines integrate in 10 degree steps, if the array being analysed has lobes much narrower than this incorrect answers will be given. It should also be noted that the fast approximate gain assumes an axis of symmetry in the antenna pattern in the zero degrees direction.

Fifthly, and most importantly, this is only a theoretical model. If great accuracy or very close to real-world answers are desired, then the only way to obtain them is by empirical methods such as those used by the NBS; ie many, many years of intensive "trial and error." Not withstanding this, it should be possible to "design" antennas using this model, and it will certainly tell you if some new idea or configuration has merit without having to build it first. It must, however, be stressed that only the final test of building an array and using it will show how successful the design is. This model will at least get the builder pretty close to the ball-park if not in a front row seat.

Finally, the limitations caused by program set-up must be allowed for. Foremost among these are the limit on number of elements; ie 10, the limit on all elements being about a half wave in length, only two dimensional arrays possible, and something that can be a real problem, the more elements in the array the longer it will take to run.

A NOTE ON MODELS

There are two basic types of models, the Empirical, and the Theoretical. Empirical models are those that have been determined after extensive experiments in actual working situations. They are formulated so as to give the actual results that have been obtained in the experiments. Theoretical models on the other hand are derived from first principles and are not linked to any particular situation. In most cases, while these two types of models will give very similar results, by definition the Empirical type will be more accurate. This is due to the need to make assumptions and simplifications in the Theoretical case.

What then is the use of a Theoretical model? The reason is simple, there only exists Empirical models for a small number of cases, and if none exists then a Theoretical model is the only option.

The model given here is of the Theoretical type. While Empirical models for Yagi antennas do exist: eg the NBS data for Yagis, they are somewhat limited in scope and can only be applied to the configurations on which they were developed. This model then, is primarily intended for those areas that have not received much experimental notice, or in perhaps more speculative areas. While the ultimate accuracy of its predictions may not be excellent, they

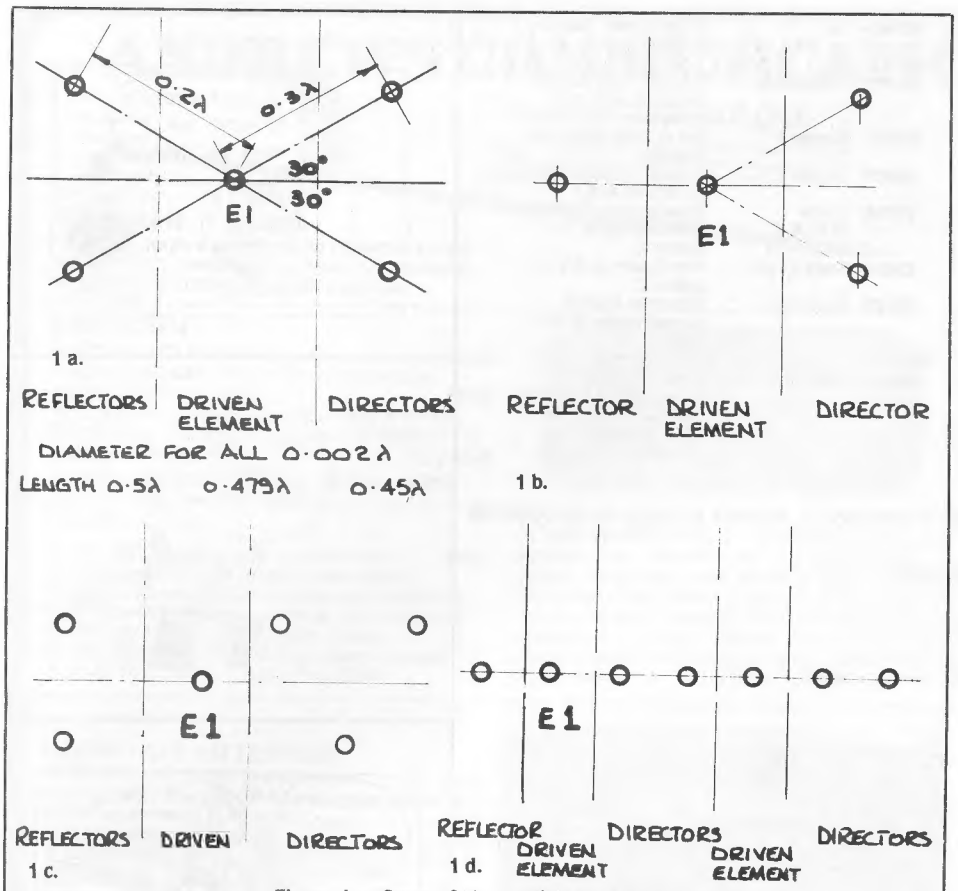


Figure 1 — Some of the possible new antenna configurations that can be analysed with this model/program.

should in all cases give a good starting point for further investigations.

NEW ARRAY TYPES

This is where this program comes into its own. You have a bright idea for a new antenna but haven't got the time to build a hundred of them to find the optimum configuration. This program will allow you to effectively do just that in a reasonably short time and for very little cost.

The number of different types of antennas are limitless, all it needs is someone to imagine them. Some examples may illustrate this.

If you take the three element antenna given as a test example at the start of this article and add a 35 ohm resistor in the reflector; ie RS = 35 ohms, then the gain goes down. This is no surprise you say; but wait. The gain goes from 7.8 to 7.3 dBi because of increased losses etc, but there are other changes as well as straight gain. If you are a fox-hunter or just someone who cares more about front-to-back then, you would be interested in the fact that the front-to-back goes from 18.2 dB to 36 dB. Furthermore, unlike similar designs that claim very high front-to-back, this figure is not very frequency sensitive. In practice, it is unlikely that exactly 35 ohms would produce this exact effect, but a value close to it should. A 100 ohm trim pot placed in the reflector and then trimmed for maximum front-to- back should however produce the desired effect. Another different configuration that could be investigated with this program might be as shown in Figure 1a.

The dimensions etc, shown in Figure 1a are not the result of a large number of iterations. Undoubtedly, if more time was spent something greater than the 9.6 dBi, that is the result for this case, could be found. This is at least of the same order as a normal five element Yagi and requires a much shorter boom. In fact, it is most similar to two stacked three element beams but without the phasing and feeding problems. Other interesting configurations are also shown in Figures 1b, c, d.

As can be seen, the possibilities abound, all that is needed is a micro- computer and some day you could have an array named after you. It is one very great advantage that amateurs have, there is a vast number of us, and quite a number have micros. The advantage that some researchers may have in access to very fast large computers is totally negated by the weight of numbers, as I stated at the start of these articles, the amateur does have a lot to offer the science of antenna theory and design. In fact, one could imagine a net where all participants have a computer with the program. Isolation of optimum dimensions could be achieved quickly if the net was co- ordinated to run a number of slightly different cases at once. The effective processing power would be quite large and very unique to the Amateur Radio Service. It might even give us something to do with packet radio besides rag-chewing — true parallel processing!

COMPLETE LIST OF REFERENCES

The following is the complete list of references used in Parts 1 to 3 of this series.

1. *Antennas* by J D Kraus, published by McGraw Hill, New York, 1950.
2. *Vertical Phased Arrays* by F Gehrke, *Ham Radio* July 1983.
3. *Yagi Antenna Design,* a series of articles by J L Lawson, *Ham Radio* 1980. The particular ones referred to are as follows:
a) *Performance Calculations* page 22, January 1980.
b) *Experiments Confirm Computer Analysis* page 19, February 1980.
c) *Practical Designs* page 30, December 1980.
4. *Antenna Theory and Design* by W L Stutzman and G A Thiele, published by Jon Wiley and Sons, New York, 1981.
5. *Antenna Theory* by C A Balanis, published by Harper and Row, New York, 1982.
6. *Applied Yagi Antenna Design* by S Jaffin, *Ham Radio* May 1984.

NOTE: In addition to the three articles by James Lawson quoted above, articles also appeared in the May, June, July, September, October and November 1980 issues of *Ham Radio.*

TECHNICAL EDITORS NOTE: A copy of Paul's program was obtained and with a few minor modifications, was tested using Microsoft Basic on a Microbee (CP/M Disk version) and also on an IBM look-alike. The calculated results given above were easily duplicated. Other configurations were tested and the results agreed reasonably with other published material. Some consideration could be given to the selective use of double precision variables to improve the calculation accuracy.

APPENDIX

A. The Cosine and Sine Integrals

These routines 14000 for Cosine Integrals and 15000 for Sine Integrals can be checked for accuracy against the following table. Note that the Cosine Integral will need the constant EU assigned before it will function correctly.

XX	XC = Ci(XX)	XS = SI(XX)	Ci(XX)	Si(XX)
	SVI 318 MICRO		KRAUS TABLES*	
0	Error	0	-	0
1	0.3376	0.9461	0.3374	0.9461
2	0.4230	1.6054	0.4230	1.6054
3	0.1196	1.8487	0.1196	1.8487
4	- 0.1410	1.7582	- 0.1410	1.7582
5	- 0.1900	1.5499	- 0.1900	1.5499
10	-0.0455	1.6583	-0.0455	1.6584
15	0.0463	1.6182	0.0463	1.6182
20	0.0444	1.5482	0.0444	1.5482

*** Reference 1.**

B. The Intermediate Z Matrix for the Three Element Example (Variable A)
(62.69, — 4.64) (67.33, 7.54) (60.43, — 7.10)
(67.33, 7.54) (73.13, 42.54) (40.79, — 28.35)
(60.43, — 7.10) (40.79, — 28.35) (53.00, — 49.49)

C. Variable List
— NE = Number of elements in array
— A (NE,NE), B(NE*2+1, NE*2 +1), X (NE*2), I2(NE* 2)
= Intermediate matrices used in simultaneous equations.
— I, J, K, L, IT = General integer counters
— EC(NE, 4) = Element currents
1 = Mag, 2 = Phase, 3 = Real, 4 = Imag. Phased stored in Radians
— EV(NE, 4) = Element voltages
1 = Mag, 2 = Phase, 3 = Real, 4 = Imag. Phase stored in Radians.
— EP(NE, 4) = Element position
1 = Disp (in wavelengths), 2 = Angle (in radians)
3 = X , 4 = Y, (3 & 4 not used here)
— EA(NE,2) = Element attributes
1 = Diam (in wave lengths), 2 = Length (in wave lengths)
— EZ(NE, 2) = Element impedances, 1 = Mag, 2 = Phase
— XX = Input to sine and cosine integrals
— XC = Result of cosine integral
— XS = Result of sine integral
— PI = 3.141542654
— P2 = PI x 2 = 6.283185308
— DR = Degrees to Radians = PI/180
— EU = Eulers No = 0.5772156649
— TI - 9, x, Z = Temp variables
— DM = Distance in wave lengths for mutual impedance
— ES(NE) = Element series resistance
— FR = Frequency of analysis
— RF = Restart flag 1 = Restart, 0 = Continue
— NN = Accuracy count for cosine + sine integrals
— SP = Sin(PHI)
— ST = Sin(THETA)
— CP = Cos(PHI)
— CT = Cos(THETA)
— SI = Imaginary sum for gain and pattern calculations
— SR = Real sum for gain and pattern calculations
— F2 = Array factor (and total pattern factor)

— F1 = Element factor
— UM = Maximum value of radiation intensity
— PR = Total power radiated
— UA = Radiation intensity
— TH = Theta (degrees)
— PH = Phi (degrees)
— DI = Directivity
— GI = Gain relative to isotropic in dB
— NC = Number of element to be changed
— XP, YP = Plot co-ordinates for pattern graphics
— MX = Maximum value
— RT = Theta (radians)
— D3 = Temp variable

D. Statements Which May Not Exist in all Basics

Line No	Statement	Replace with or Comment
2	Defint, I, J, K etc	Makes I etc integers, not really necessary, can be left out.
1510	On Gosub	On Goto can be used to Goto a table of Gosubs
20000	CLS	Clear screen. Can be left out
16590 & others	Print using	Formatting of output modify to suit own computer
23006	Screen 1	Set up high resolution graphics
23008	Locate X,Y	Position print cursor on screen at X,Y
23016	Circle (X,Y),R,C	Draw a circle centre at X,Y of radius R, in colour C
23019	Pset(X,Y),C	Plot A point at X,Y in colour C
23078	Screen 0	Return to normal screen mode; ie text only
40240 & others	Swap X,Y	Swap contents of variables X & Y can be replaced with three lines and a dummy variable

Corrections to Part 1

The author has made the following corrections to Part 1 (see page 11, August), to clarify the calculations.

Equation 3a. should read:
3a. $F(\theta,\phi)=K*(\cos(90*\sin(\theta)*\cos(\phi))/\mathrm{sqr}(1-(\sin(\theta)*\cos(\phi))^2)$

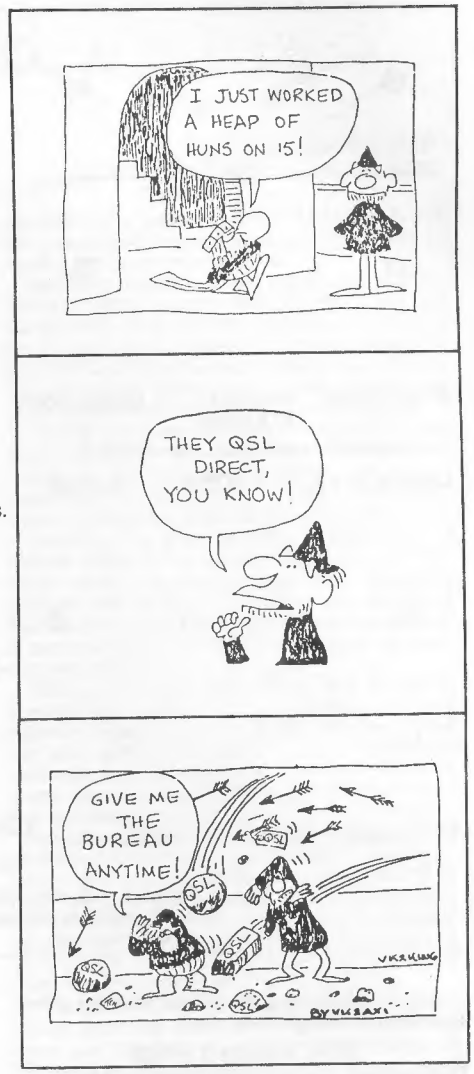
Equation 4. should read:
4. $F(\theta)=K*(I_1<A_1+I_2<(A_2+(2*\pi/\lambda)*S*\cos(\theta))$

Equation 7. should read:
7. $F(\theta,\phi)=K*{}^{N}\Sigma_{n=1}\, I_n<(A_n+(2*\pi/\lambda)*S_n*(\sin(B_n)*\sin(\theta)*\sin(\phi)+\cos(B_n)*\cos(\theta)))$

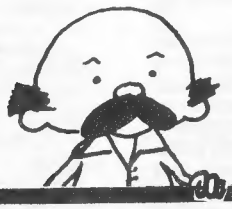
Reference 5, the authors correct name is Balanis.

Some confusion is possible in the co-ordinate section, (bottom col 1 page 11), as there is a false impression that X=1, Y=1, Z=1 is the same point as R=1, θ=45 degrees, ϕ=45 degrees. This is not the case. In fact the equations relating the co-ordinate systems are given below.
$X=R*SIN(\theta)*COS(\phi)$
$Y=R*SIN(\theta)*SIN(\phi)$
$Z=R*COS(\theta)$

or
$R=\sqrt{X^2+Y^2+Z^2}$
$\theta=ATAN(\sqrt{X^2+Y^2}/Z)$
$\phi=ATAN\ Y/X$
The actual equivalents are:
For X=1, Y=1, Z=1 is equiv to R=1.732, θ=54.736°, ϕ=45°
For R=1, θ=45°, ϕ=45° is equiv to X=0.5, Y=0.5, Z=0.707



Cartoon courtesy *The Propagator*



PUBLICATION OF COMPUTER PROGRAMS

Part of the technical editing of computer programs involves running the program. This has meant re-typing it from a listing supplied from the author. Many hours are spent by the editors entering the program, especially if, as does often occur, syntactical errors are introduced.

In future, to overcome this hold-up, alternative forms of program entry may be required; eg cassette, disk, or via a modem. This will enable quick editing. If we do require the program in one of these alternative forms, we will provide the blank cassette, disc, etc, or make the telephone call in the case of modems.

Finally, a word of advice. Computer programs on their own do not make good articles. Please include with any program a description of your algorithm. Articles are much more interesting when they include, not just a description of the **how** but also the **why**. Please use your blackest ribbon for your print-out.

SATELLITE TELEVISION

Australia's commercial television networks have received permission from DOC to relay their programs using AUSSAT. Regional stations will be able to receive the capital city programs and rebroadcast them in their viewing areas.

An encoding system will be used for the next six to 12 months, designed to limit unauthorised reception by electronic enthusiasts and others. Because television encoding technology is new to Australia, the networks will replace this encoding system with one which will be totally secure.

The networks have warned householders in country areas about decoders they may be offered. The decoders will not provide satisfactory pictures and sound during the interim period and will be useless when the totally secure permanent system is introduced.

BLUE CHIP COMPUTERS

A cheap IBM compatible personal computer is being tested on the US market.

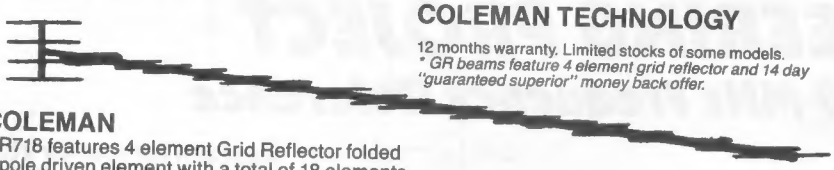
It will sell through discount stores, instead of specialty computer outlets, for US$699 and be the cheapest PC sold through US retailers.

Called the Blue Chip, it undercuts every other compatible computer in the US by at least $200. It has 512 000 characters of memory, one floppy disc drive, a one year warranty, and the operating system used on IBM's best-selling PC.

The computer is the most dramatic evidence yet of the fall on personal computer prices, now 30 percent lower than last summer in the US. Industry leader, IBM, in August cut its price by 20 percent in a move to keep its share of the competitive market.

—Submitted by Jim Linton VK3PC

ANDREWS COMMUNICATIONS SYSTEMS



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COLEMAN BEAMS NOW IN STOCK
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- 10/11m 3 el Yagis on 3.7m boom ..... $79 ea

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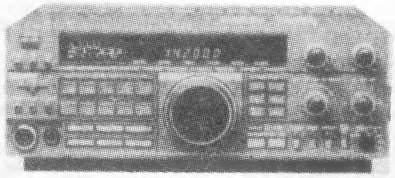
- CORONA/JUMBO HP.240DX, 200W RF o/p 3-30 MHz, adj rx amp, 4 pos o/p. (Compare to HL-200E and save!) ..... **Only $349**
- **PANTHER power supplies; 2A $55. 4A $69**



KENWOOD TS-440S . . . $1550

Includes automatic tuner, mic. Why pay $1585? HF transceiver 100 ch memory, 100W RF o/p, SSB-CW-AM-FM, 0.15-30 MHz rx, selectivity switch, notch, IF shift, NB, etc.
Full 12 months warranty.

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RG-213 by Benelec . . .$2.50/m
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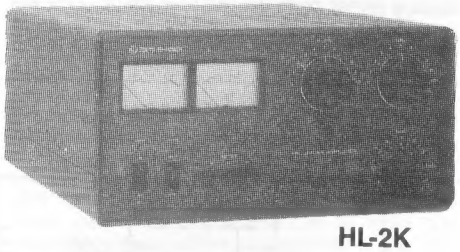

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Telereader CWR-880 allows CW/BAUDOT/ASCII reception. This amazing new communications terminal features an LCD screen with 16 characters x 2 lines. TOR, ARQ, FEC, AMTOR decoded. CW random generator. 90 day warranty

FT-270H (45W) $679 ~~$879~~

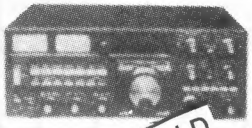
Yaesu FT-270H 2m FM features 10 ch memory, rptr, 45/5W o/p, 0.2 uV sensitivity, PMS. Last few.

FRG-8800 $950 ~~$1145~~

Yaesu FRG-8800 comms receiver allows 150 kHz to 30 MHz full coverage. AM/FM/SSB/CW modes.

FRG-965, Inc MMB-28 $999 ~~$1090~~

Yaesu FRG-965 V/UHF scanning receiver covers 60-905 MHz. AM/FM/SSB. AC/DC.



Modules 70cm $460, Satell $185

FT-726R SOLD $1899 ~~$2120~~

Yaesu FT-726(R) SSB/FM/CW, 10W o/p, AC/DC transceiver.
inc 2m mic, DC.

KENWOOD TM-201B

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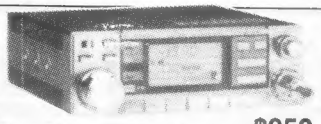
FM 2m 45/5W mobile, 5 ch memory transceiver. Compare to KYOKUTO and AZDEN 25W radios.
12 months warranty on our Kenwood.



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Professional scanning receiver covers 25-550 and 800-1300 MHz in two continuous tuning ranges. AM/FMN/FMW, 0.3 uV AC/DC. Priority, delay, etc.

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AN AMATEUR RADIO ENGINEERING PROJECT

Part 2 — A 10 MHz Frequency Reference

Kenneth Kimberley VK2PY
21 Nicoll Street, Lakemba, NSW. 2195

The first part of this article described the results of a number of experiments designed to explore the characteristics of crystals and crystal oscillator circuits.

Part two describes the circuit, construction details and the measured performance of a temperature controlled crystal oscillator based on the lessons learned in the previous article.

Now read on . . .

Some oscillator manufacturers oven the crystal only, leaving the overall stability to the vagaries of the associated components. The design described below, controls the entire circuit right down to the last nut and bolt. The plan is to eliminate, as far as is possible, frequency changes caused by oscillator capacitor change, voltage fluctuations, internal changes within the transistors, not forgetting the mechanical changes.

330) and 990 pF (3 x 330) capacitors at C1 and C2.

The use of multiple components made it a little easier to establish the optimum condition. The technique is to gradually increase C1 and C2, whilst monitoring activity and output. A point will be reached where oscillation will not readily commence, hence slightly lower values must be fitted. These high values will also reduce the reaction of internal change within the transistors to a minimum.

The crystal itself was chosen to work into a 40 pF load, but C1 in series with C2 is much higher than 40 pF. However, this problem is overcome by the stratagem of connecting the various trimming capacitors in series with the divider so that the total now becomes = 40 pF. At this point, mention is made of what appears to be a rather complex trimmer set-up. The silicon power rectifier (IN4004) is used as a "varicap." Dedicated varicap diodes are much stability. Hence, their use should be avoided wherever practicable. Not withstanding the previous comment, circumstances almost dictate the use of one at C7. However, any problems here are partially circumvented by limiting the total available frequency variation to about 100 Hz. The NPO ceramic capacitor C4 (4.7 pF) is used for this purpose. Stability requirements make the use of high class capacitors around the oscillator mandatory. To this end, C1 and C2 are styroseal, C3 through to C6 are NPO ceramic.

The trimmer C7 is a multi-turn 17 pF unit, available from Microwave Developments, and seems quite stable.

A degree of buffering is gained by taking the output from Q2 collector at the expense of a distorted waveform. This is of no real concern as it will be converted to TTL in the forthcoming square-wave generator. If this represents a real problem it may be readily filtered by a tuned

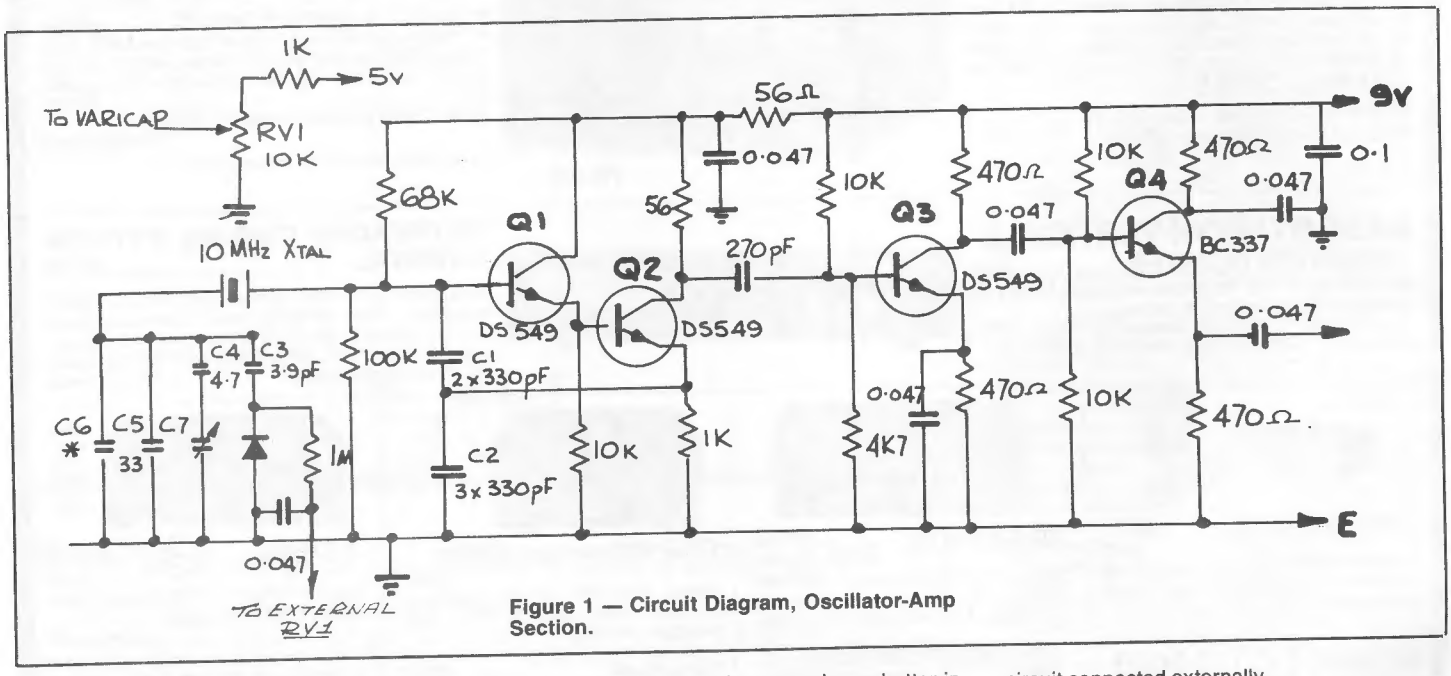


Figure 1 — Circuit Diagram, Oscillator-Amp Section.

Before detailing the construction, a brief circuit description will be presented, refer Figure 1. The signal part of the unit consists of four transistors. Transistors Q1 and Q2 function in the good old reliable *Colpitts* circuit, Q3 buffers the output whilst Q4 is an impedance converter.

It will be observed that the first two transistors are *Darlington connected.* This configuration gives a greatly increased gain over a single transistor leading in turn to a relatively high input impedance. Higher values of resistance may now be used in the bias network. Practical values of 68k and 100k were arrived at. These high values tend to keep the crystals operating Q higher than that normally attainable with one transistor. This in turn, narrows the bandwidth and hence less oscillator noise. The Darlington allowed the use of 660 pF (2 x

more expensive and do not work any better in this application. Note that RV1 is used as a remote control of its capacitance. This feature is to enable the correction of small drifts, caused by aging, etc, without the necessity of dismantling the unit. The 3.9 pF capacitor C3 limits the available adjustment to approximately 30 Hertz.

C5 and C6 must be adjusted on test and this is done in the following manner. Set C7 and RV1 to mid-point then adjust C5 and/or C6 by trail and error until the frequency is as close to 10.000 MHz as possible. Consideration may be given to fit a "small trimmer plus capacitor" here.

The use of a trimmer here makes for easier adjustment. However, mechanical trimmers have a notoriously bad reputation for uncertain

circuit connected externally.

Additional buffering and output voltage is obtained via Q3, a type DS 549. Note the lowish coupling capacitor C8 which was kept down to 270 pF. This value was selected as a compromise between loading and output. Q4 (BC337) is used as an impedance converter to drive the output coax.

As it is intended to derive the power requirements from the coming square- wave generator, the supply was set at twelve volts. There being two main reasons for this, one being that it may be required to encourage the high frequency operation of reluctant CMOS integrated circuits in the generator, and the other to keep the current lower for a given power in the heater.

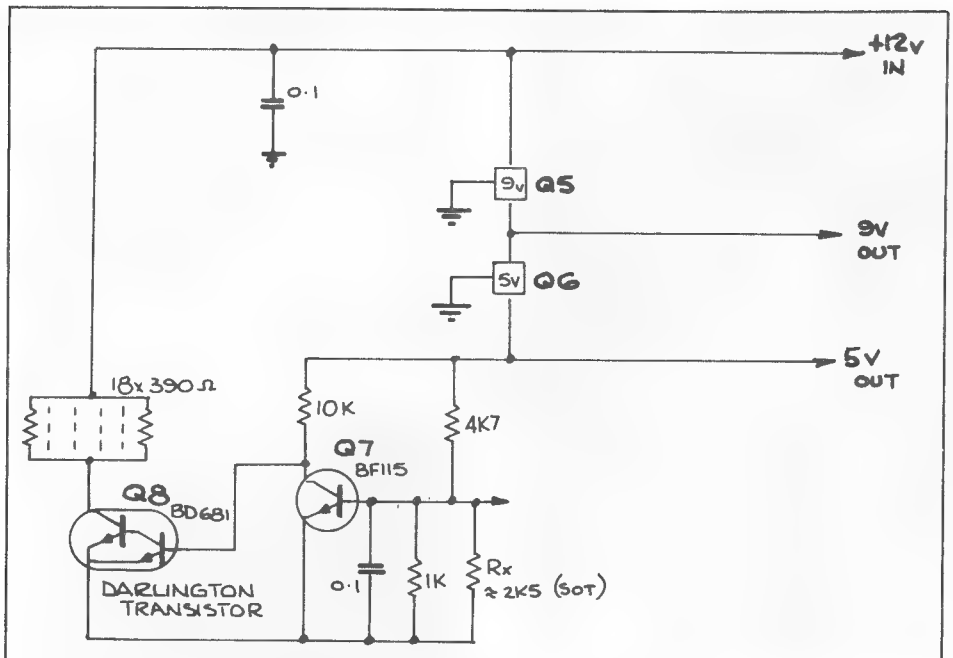


Figure 2 — Power Supply and Temperature Control Details.

CIRCUIT DIAGRAM

There are two on-board regulators provided within the oven enclosure being nine and five volts respectively, (see Figure 2), the former supplying the single electronics, and the latter going to the heat control sensor. Most semiconductors are heat sensitive in one way or another, regulators being no exception, hence the decision to oven them thus ensuring a much more constant output. Note that the prime source, 12 volts, is already regulated, hence the nine volt is doubly and the five, trebly regulated. Therefore, the power source stability should be beyond reproach. The use of a single supply line also reduces by two the number of conductors going into the enclosure. This makes the sealing easier and reduces heat loss by conduction.

OVEN HEATER

The heater element, used in the final version, consists of 18 parallel connected 390 ohm metal film resistors.

The energy is supplied from the 12 volt regulated supply, control being via the temperature sensing element Q7 (BF115) driving another *Darlington* (Q8 BD681). Q7 should be mounted in close contact with the crystal cover; ie soldered.

The final operating temperature is set by "R" and needs to be adjusted on test. A variable resistor is not recommended due to their doubtful mechanical stability. However, a multi-turn trimmer is used to ascertain an approximate value. Subsequently replaced by a metal film resistor of the next lower preferred-value and a 500 ohm multi-turn pot (RV2).

All of the electronics is housed inside a die-cast box which is then surrounded by styrofoam, etc. Further insulation and a neater finish is obtained by mounting the unit into a plastic *Zippy Box*.

Figure 4 — Mechanical Details.

MECHANICAL DETAILS

Describing the constructional aspect of this unit appears to be a more difficult proposition than actually doing it, however, please bear with it, even though the following may become a little tedious. (See Figure 4).

Proceed as follows — roughly shape the H5610 Board to the internal outline and dimensions of the die-cast box (DCB). Next, cut clearance notches around each of the four corner blocks. A quick trim with a file and it should fit snugly, resting on the eight webs moulded into the bottom. A three millimetre hole is drilled in a convenient position near each of its corners.

The template, thus produced is used to mark the location of holes in the base. Remember to drill from the inside and de-burr. The DCB is then used in a similar manner to mark the mounting holes on the copper side of the PC-material. Ensure that they fit together symmetrically.

After drilling and countersinking (glass side), screw the two together, complete with lock-washers under each nut. A six millimetre hole should now be made in the control cable end of the DCB.

Temporarily run a second nut and flat-washer down each of the four 2.5 mm screws. These will serve as an adjustable mount for the electronics board, which should now be dropped into place. The vertically mounting heater resistors, being the tallest of the components, should be used to verify the lid clearance. Move the height adjuster nuts for equal spacing top and bottom, and then lock them into place using a little paint, etc.

The method used to mount the DCB into the Jiffy Box is similar to the above, hence this part will be left to the constructor's imagination.

The two pieces of one millimetre bakelite, etc, are used as an insulated base plate. Originally a scrap of aluminium sheet was used, however this proved to be unsuitable due to its good heat conductivity, degrading temperature control.

At this stage mark out and drill a four millimetre hole in each corner of the insulated base. The main earth wire connects from a solder lug, under one of the mounting nuts, through the end of the Jiffy Box onto the PC-material.

The remaining scrap of PC-material becomes as insulator by being cut, trimmed and glued (metal side down) to fit neatly into the base between the webs and the 2.5 mm nuts.

Provision is made for the interface cables via a six millimetre hole in the Jiffy Box. Ensure that the two six millimetre holes do not align with each other. The idea being to reduce unnecessary heat loss. The constructor may, at this time, care to provide a tag terminal handy to the outside six millimetre hole.

Obtain and cut to size the various insulating pieces, which will later be fitted between the six faces of the DCB and the Jiffy Box. Satisfactory material includes styro-foam, old PC-material, mica, and bakelite.

WIRING

That about completes the metal bashing, so now we will look at the wiring. The first stage to be addressed is a general layout of the board. Allocate about 50 percent of the available space to the oscillator; ie Q1, Q2 the 10 MHz crystal, its socket and the various tuning capacitors.

The remaining space accommodates Q3, Q4, Q5, Q6, plus associated minor components, as well as terminating pins, etc.

Note that pins are provided for all parts that could require changing during the adjustment routine. Pins are also provided for the semiconductors and the crystal socket. With the benefit of hindsight, it may have been prudent to use a wire-in type of crystal, thus eliminating a possible future trouble spot.

The electrical earth bus system is installed as follows. A 10 mm strip of copper (or tin plate) goes across the oscillator end of the board, leaving one clear row of holes which will be used for the temperature control transistor and its circuitry. Holes should previously have been drilled through the earth strap to coincide with those existing in the electronics board. Likewise, fit a solder lug over the remaining holes at the other end of the board. These two lugs are connected together by bare stiff number 18 gauge wire, which is then extended parallel to, and approximately eight millimetres from the bottom edge, along to the copper strip. Remember to leave sufficient space for the heater resistors.

The positive supply rail runs along the top edge spaced as per the earth line. However, it stops short of the middle, the exact point should be immediately adjacent to the collector of Q3. Bare tinned wire is again used and is soldered to strategically placed pins. The Q3 end is extended by means of the decoupling resistor and finishes with another pin opposite Q2 collector.

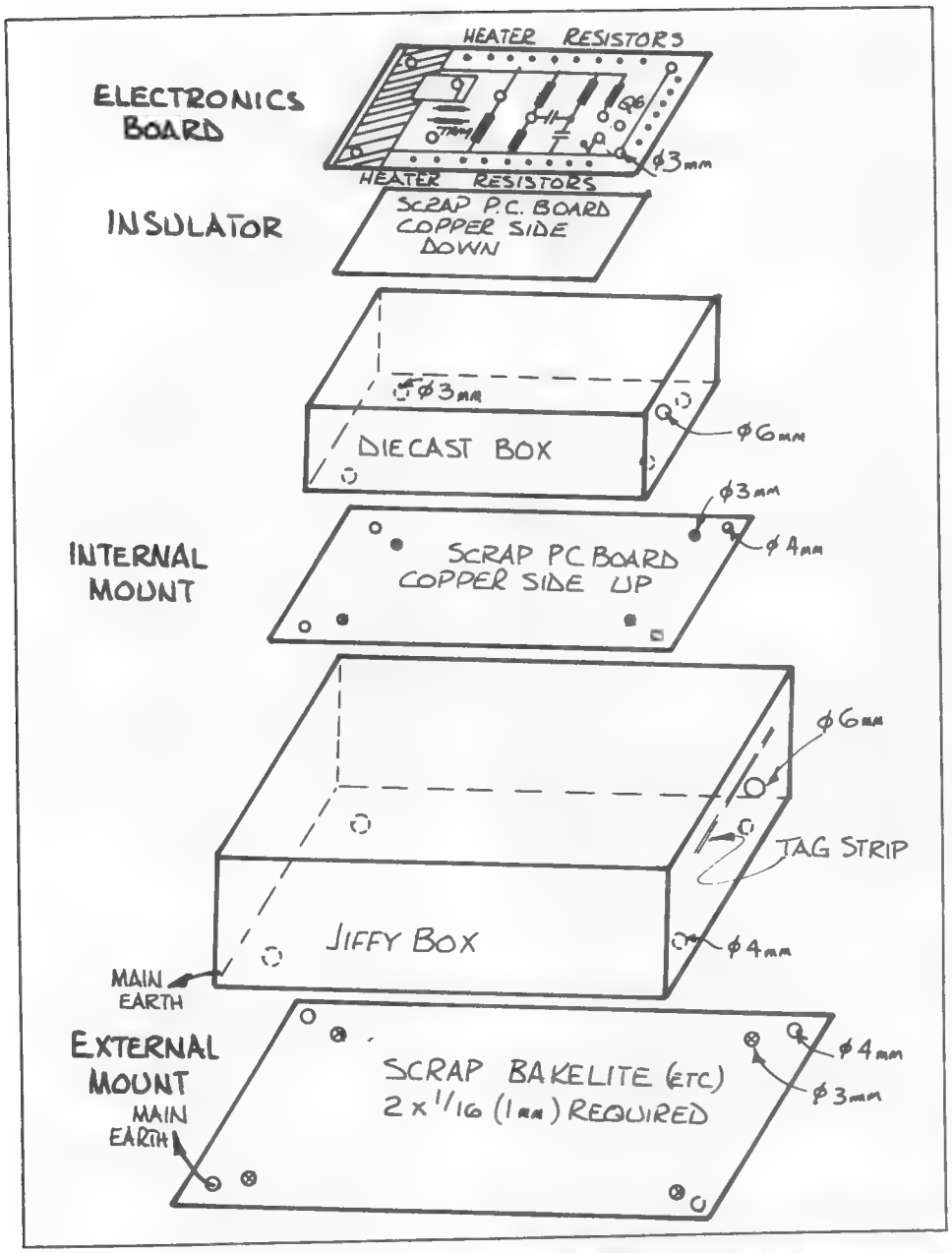
Prior to the actual assembly, it is strongly recommended that all of the component parts be placed on the bench top and moved around until a suitable configuration is arrived at. The layout of the remaining circuitry almost suggests itself; ie the DC supply is from the top to the bottom of the board, whilst the signal path is from the left to the right.

With the above in mind, insert the pins for the transistors. The base pins for Q3 and Q4 should be on the centre line, emitter Q1 and collector Q2 likewise. Now wire in the various resistors associated with the transistors. These go direct from the supply rails to the transistor pins, via conveniently placed lands on the board.

The control pins are now inserted and are grouped vertically close to the right hand end of the board. At this stage, find a suitable position for the two regulators and insert their respective pins.

Now we are coming to the actual oscillator. This is wired in a similar manner; ie a judicious mixture of pins and tinned wire. The crystal is placed flat on the board and extends approximately half-way over the copper strip to which it is firmly connected (soldered) by a short length of wire. Now fit the oscillator pins into their assigned position, where necessary connect together and then solder in the various tuning capacitors.

Mention must be made of the temperature sensing transistor, Q7. This is connected to its



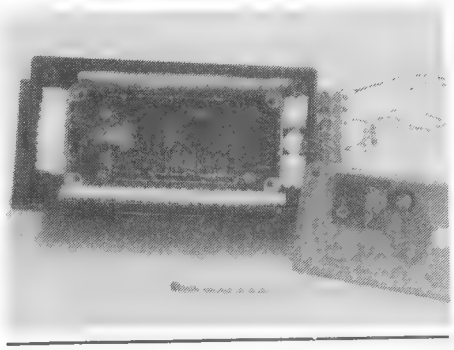
circuitry via pins at the extreme end of the board. These are positioned in such a way that the transistor may be bent over and soldered onto the crystal can.

The remaining components, including the semi-conductors, are now wired in. The control wires for the varicap and the temperature sensor should be routed as far as possible from the oscillator circuitry and made rigid by gluing to the board.

The time is rapidly approaching, when the constructor begins to see some results. The unit may now be powered up, but first switch on the station frequency meter or digital readout equipped transceiver and allow them to warm up. Next, run five wires temporarily, three to RV1 and two to the 12 volt supply.

Connect the counter, etc, to the 10 MHz output pin, switch the supply on, stand back and carry out the old "smoke test." If all is well, shift attention to the counter which should be counting away merrily.

The frequency should be quite close to 10.000.000 provided that the specified crystal and components were used. Note that other manufacturers equivalent components may be



Internal View.

used as long as the calibration tolerances are similar.

Preliminary frequency adjustments may now be made; remember a final touch up will be required later. C3, C4, C5 and C6 are organised as follows:

1. Set RV1 and C7 at mid-point.
2. Leave C3, C4, and C5 as specified.
3. Trim C6 until frequency is very close to target, if possible to within 20 Hz and preferably on the high-side. (Strays will be higher when the board is in the DCB).
4. Rotate C7 from minimum through to maximum. Hopefully, the frequency excursion will be in the order of 100 Hz. If not, change C4.
5. Return C7 to mid-point and rotate RV1 from minimum through to maximum. This time the frequency excursion should be about 30 Hz.

When satisfied with the above adjustments mount the oscillator into the DCB, not forgetting the under-board insulator and spring washers under the fixing nuts.

FITTING TEMPERATURE CONTROL

At this stage a little more metal work and wiring is required. Firstly a six millimetre hole should be drilled in the lid immediately above C7. A second hole needs to be provided for the thermometer used in setting up.

This is kept away from both the crystal circuitry and heater resistors. A point midway between Q1 and Q2 and a little above the centre line is a good spot. Even so, inserting the thermometer moves the frequency a few Hertz.

The BD681 oven controller should now be fitted to the inside of the lid. Mount it opposite the thermometer hole and as near as practical to the bottom edge. The transistor leads should face away from the oscillator circuitry and arrangements made for the connections to come out of the lid. These wires should be firmly fixed so as to prevent any possible instability.

The method used by the author was as follows. A 10 mm hole was drilled in the lid and then covered by *Vero-board.* Three circuit pins were then inserted and Q8 wired to the appropriate tracks.

INSULATION

The next step is to mount the DCB as follows. Fit the thermal insulator into the bottom of the Jiffy Box and then screw in the DCB. Run the control; wires, etc, through to the tag strip at one end, whilst the earth wire goes out though the other.

Make one last inspection of your work, and if it is okay screw the lid firmly onto the DCB. Next pack insulation between between the four edges of the DCB and the Jiffy Box. Cut another insulating piece and lay it on the top.

TEMPERATURE ADJUSTMENT

The oven operating temperature is set as follows. Temporarily connect a 10 kohm multi-turn pot, or decade box to the Sensor Control Points and set it to maximum "R." Next insert an ammeter in series with the power supply, and place the thermometer into the designated hole. Ensure that it rests on the oscillator board and is safely supported, externally, so that it cannot fall over and break. (Thermometers are too expensive and inconvenient to replace).

Switch the supply on and observe the ammeter. At this stage, the oven heater should be biased off and the meter will indicate only the current being drawn by the electronics.

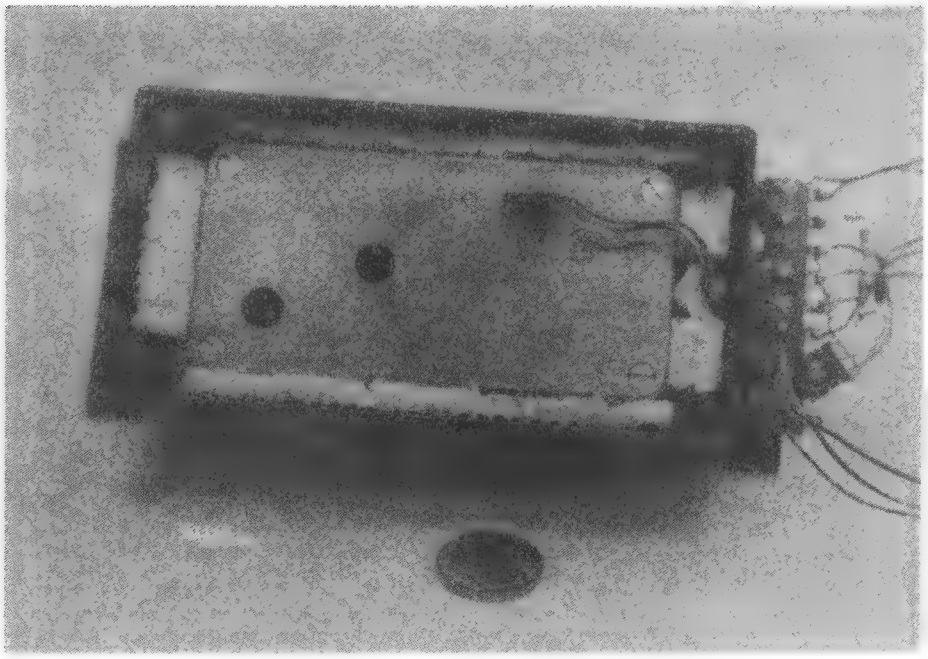
Carefully adjust the 10k pot whilst monitoring the ammeter. A point will be reached where the current will gradually increase to approximately 500 mA. Now "back-off" the pot a little so that the heater current drops to 450 mA.

The temperature inside the box will commence to rise and the current slowly decrease until stabilising at around 200 mA. Carefully repeat the adjustment several times until the temperature gets to around the 60 degree Celsius mark.

SENSING RESISTOR

When the indicated temperature reaches that

Unit showing the Frequency Adjusting and Thermometer Holes, Over Element Wiring and Heat Insulation.



which is desired, switch off, disconnect and measure the set resistance of the multi-turn. Now obtain a metal film resistor of the next lower preferred value, build it up to approximately 250 ohms lower than the measured value of the "preset."

This network, along with RV2 (500 ohms) is then soldered onto the tag strip.

The author's model required a resistance of 2.615 kohm and was made up with a 2.2 kohm in series with a 220 ohm unit, RV2 making up the final value.

STABILISING TIME

Re-power the unit and allow it to settle for at least one hour. The relatively long stabilising time is due to the low heater power of six watts, and the large thermal mass of the oven enclosure.

If the temperature is other than desired, trim RV2 a little, again allowing a similar settling time.

When all is well, leave the unit run overnight. This long run will eliminate an initial tendency to hunt and should ensure that the temperature gradient within the stabilised oven is minimal. RV2 may require further trimming after this period.

FINAL FREQUENCY ADJUSTMENT

The stage has now been reached where the final frequency adjustment is made. Assuming that the crystal oscillator has been running continuously for at least one week, proceed as follows:

Method One — This is used where a good counter is unavailable.

a) Tune to WWV or a similar station on a general coverage receiver.

b) Set the receiver to AM-mode — narrow selectivity — and plug in headphones.

c) Tune C7 for maximum "C" through to minimum whilst carefully listening to the beat. The zero will be a little difficult to detect due to the modulation present. With care it should be audible as a low pitched note of approximately 50 Hertz at each end of C7's travel. As C7 is rotated, the note will become lower until it falls below the ears low frequency response, and will reappear on the other side.

Note the zone of inaudibility, and set C7 at the middle. The average ear fails at about 25 Hertz and therefore the area of uncertainty will be ±25 representing a possible error of 2.5 ppm. However, in practice, it should be better than 1 ppm. The use of a CRO and a simple low pass filter (150 kohm resistor and a 0.1 mF capacitor) should assist in the setting of the zero point to better than one Hertz. Use RV1 to do the final trimming.

Method Two — Using A Frequency Counter

The counter used by the author for all of the development work was a Leader type LDC 85, which has an ovened time base and is specified accurate to ±0.03 ppm ± one count. Any error introduced as a result of the stated tolerance may, for practical purposes, be neglected.

a) Switch counter on and allow it to stabilise for several hours.

b) Set time base to one second.

c) Adjust C7 until counter indicates 10,000,000.

d) Change time base to 10 seconds.

e) Fine trim, with RV1, to 0.000.000.0 (overflow).

Method Three — Lissajous Patterns

The equipment requirements here are: i. A CRO which has both the vertical and horizontal deflection circuitry available for the inputing of external signals and ii. an accurate reference frequency source. Maybe a counter with a lower resolution than required for Method Two, but utilising an ovened crystal.

a) Have frequency reference fully stabilised.

b) Connect reference to the horizontal input and the oscillator under test to the vertical (or vice-versa).

c) Adjust levels to obtain a convenient sized pattern.

d) Carefully adjust C7 until a nearly stationary circle is displayed.

e) Fine trim with RV1.

f) Remove test equipment but leave your oscillator running.

Method Four —

This method is used where both deflection circuits are not accessible. In this case, a standard dual beam CRO may be used. Proceed as follows:

Connect "the frequency reference", or whatever, to channel one and then select time base to 0.1 uS per division, the gain to give a picture of about four divisions high, and the synchronising to channel one.

Feed the oscillator under test into the other input and again set the controls to give a similar sized picture.

Slowly move C7 whilst watching trace two. Gradually a sine wave will appear, moving from one side to the other as the trimmer is adjusted. A point will be reached where the direction reverses. Stop, when this appears, you have gone too far. Again use RV1 as a final trimmer and set it so that both traces are rock steady.

Method Five —

This method may be used when only a simple single beam CRO is available. Connect both signal sources together via a suitable resistor pad, capacitors and diode. Thus forming a simple mixer.

a) Connect the output from this mixer to the CRO and adjust gain to suit.

b) Adjust C7 to near zero beat.

c) Trim with RV1.

Each of the above methods has its own shortcomings:

1. The main problem here is the modulation WWV.
2. The accuracy of the counter time base.
3. The accuracy of the reference source.

4 & 5. As for three.

The author used Method Two for all of the development work and Method Four for the final adjustment. However, whilst overall accuracy is highly desirable, the main requirement is really stability and repeatability.

AGING

This parameter is rarely mentioned in the general run of amateur radio literature, as it is usually well masked by other aberrations. However, this project has been developed to a stage where the aging shift predominates.

The main causes of aging are contamination within the holder that is redistributed with time, slow leaks, mounting and electrode stresses which are relieved over a period, and "oil-canning." The latter problem is where barometric pressure acts on the crystal can. Positive aging is the most common type and is usually due to the transfer of contamination from the vibrating surfaces. Generally, negative aging is due to leaks in the can.

Following the frequency setting, the oscillator was left running continuously for a period of 300 days, the frequency was measured and plotted daily. In the interests of consistency all measurements were taken at the same time of the day.

Figure 3 shows the results in a compressed form. The readings for each 10 day period were averaged and then plotted. The graph shows that the aging rate exceeded 0.1 Hertz negative per day for the first seven weeks, and then settled down to about 0.06 Hertz until day 150. An unexplained positive movement developed for the next 20 days, then returning to 0.06 negative.

The change, over 300 days, totalled some 17 Hertz, which averages out to 0.057 per day (0.006 ppm). This represents a yearly rate of 2.1 ppm and compares favourably with the generally accepted industrial rate of 3 ppm for resistance welded holders.

Further improvement may be had by using a crystal with a cold welded can or, even better, a glass mounted type. These types have an aging rate of about two and one ppm respectively. A dual oven; ie one within the other, would also help, however one has to stop somewhere or end up emulating the famous Dodo Bird and its ever decreasing circles.

Moreover, proceeding along these esoteric paths leads to more troubles than both

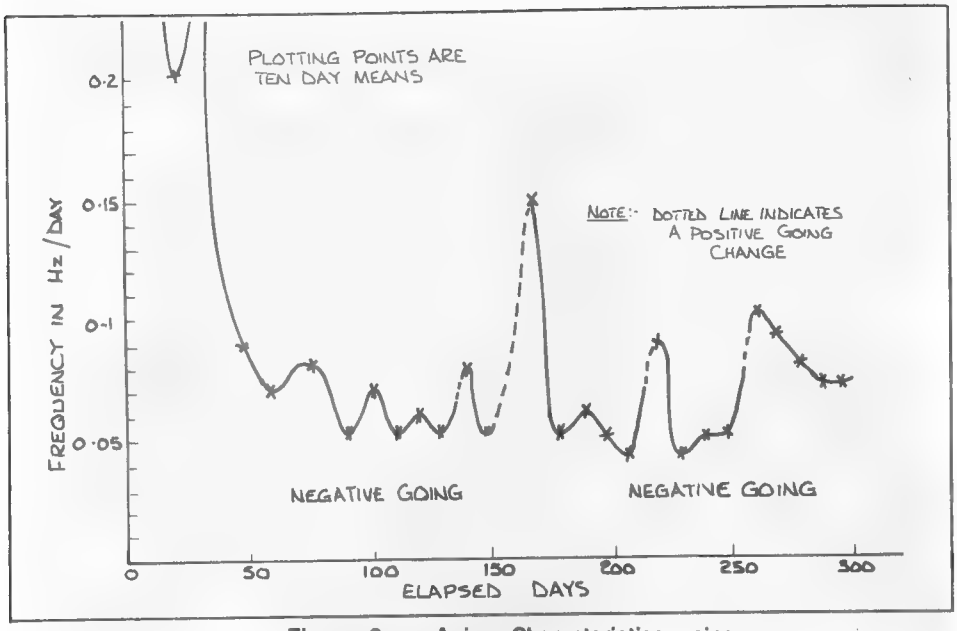


Figure 3 — Aging Characteristics using Crystal Type KBD 40.

Pandora and *Murphy* together could ever dream up. Not the least being the measuring accuracies required and of course that ever present problem — cash!

SUMMARY OF RESULTS

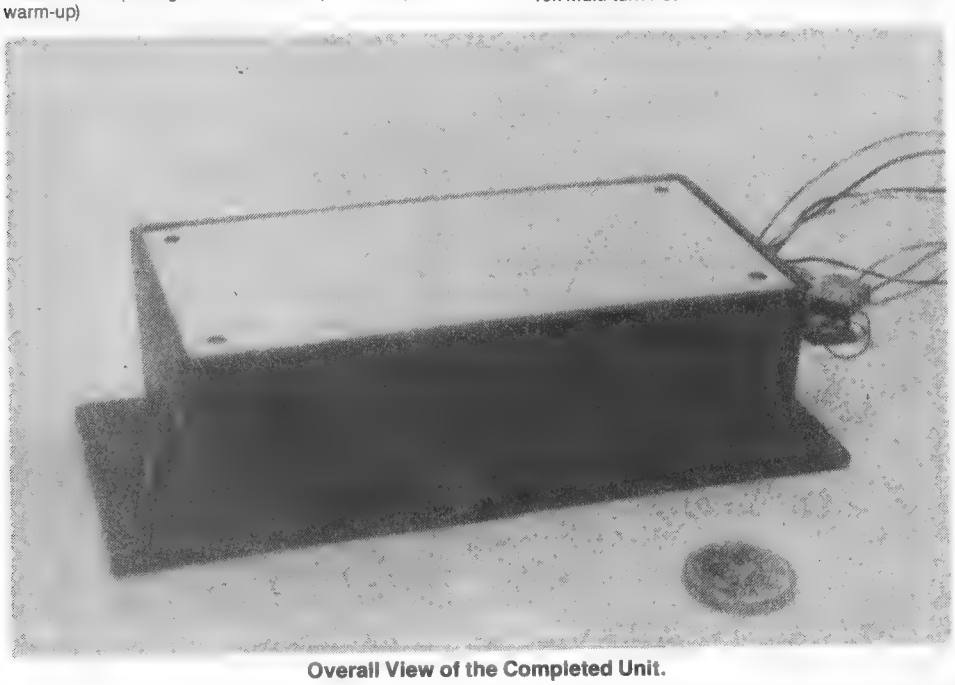
At this point, the project was terminated and a summary of the results were obtained. They are as follows:

Nominal Frequency	= 10.000.000 Hertz
Daily Stability (including aging)	= ±0.1 Hertz = 0.01 ppm
Aging Rate per 10 Days	= -0.6 Hertz = 0.06 ppm
Yearly aging	= -22 Hertz = 2.2 ppm
Oven temperature	= 55.5 degrees Celsius at 23 degrees Celsius Ambient
Oven Temperature "Jitter"	= ±0.1 degrees Celsius at 23 degrees Celsius Ambient
Oven Temperature	= 54.8 degrees Celsius at 43 degrees Celsius Ambient
Oven Current (during warm-up)	= 500 mA (= 6 watts)
Oven Current (sustaining)	= 200 mA (= 1.2 watts)

It is imperative that this unit runs **continuously** otherwise the performance will be degraded.

PARTS LIST

Resistors Value ohm	Quant	Source Dick Smith Code
56	2	R 0544
390	18	R 0564
470	4	R 0566
1.0k	3	R 0574
4.7	2	R 0590
10	5	R 0598
68	1	R 0620
100	1	R 0624
1M	1	R 0648
10k Multi-turn Pot	1	R 1901



Overall View of the Completed Unit.

Capacitors pF		
C1 660	(2 x 330) Styro	R 2831
C2 990	(3 x 330) Styro	R 2831
C3 3.9 NPO	1	
C4 4.7 NPO	1	
C5 33 NPO	1	
C6 Adjust on test		See text
C7 17 Multi-turn Trimmer		Microwave Developments R 2839
C8 270 Styro		
47 nF Ceramic	7	R 2327
100 nF Ceramic	3	R 2360
Semi-Conductors		
DS549 Transistor	3	Z 1319
BC337 Transistor	1	Z 2910
BF115 Transistor	1	Z 1560
BD681 Darlington	1	Z 1462
IN4004 Silicon Diode	1	Z 3204
78L05 Regulator	1	Z 6108
78L09 Regulator	1	
Miscellaneous		
Die Cast Box (100 x 50 x 25 mm)	1	H 2221
Jiffy Box (130 x 68 x 41 mm)	1	H 2763
IC Board (Cut Down)	1	H 5610
Scrap Board 1 mm Bakelite		
Circuit Pins		H 5590
Screws, Nuts, Solder Lugs, etc.		

TELEVISION

The inauguration of an "experimental" regular television service by the BBC in November 1936, aroused sufficient public interest to justify television making steady progress towards a wider popularity. The proviso was that "so long as good programs can be maintained."

The opening ceremony was conducted alternately by the Baird and Marconi-EMI systems.

The transmitting apparatus was installed in the Alexandra Palace, with each company installing separate equipment.

The Baird system was on 240 lines whilst the Marconi-EMI was on 405 lines.

In the Baird system, three different types of scanning equipment were provided — for studio work "Spotlight" scanning was used — a beam of light was focused through a small water-cooled rectangular window situated at the top of a scanning unit. The scanning disc revolved at 6000 RPM with 240 apertures arranged in four spiral traces, whilst a second disc had a spiral slit and acted as a shutter so that only one of the 240 holes was exposed to light at any one instance.

The transmitter used crystal control, the crystal oscillating at 1.406 MHz, with the output being passed through amplifiers and frequency-doublers.

The Marconi-EMI system was completely electronic, with an Emitron camera employed as a link between the visible and electrical. The basic unit, a pulse generator, provided the necessary pulses for operating the camera and synchronising signals.

—From *Wireless World*, 1936

INTERNATIONAL E-POST

A new electronic mail service, available through Australia Post, guarantees next working day delivery from Australia to over 20 000 towns in the United States of America.

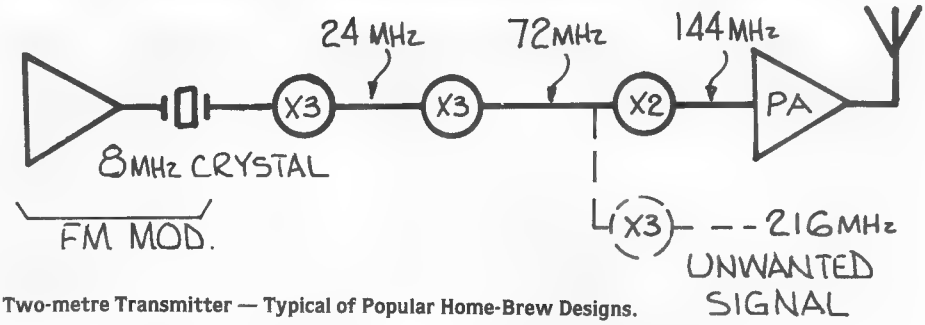
The service, International E-Post is aimed at the Australian and American businesses who require fast delivery. Documents are hand delivered to an electronic mail-equipped post office and then transmitted to a post office in the US.

The message is then printed on high quality paper complete with company logo and signature if necessary and then delivered by courier or mail to its final destination.

DESIGN OF A BAND-PASS FILTER FOR THE TWO-METRE BAND

B P Dilworth VK7BD
4 Anson Street, Waverley, Tas.

Having recently acquired an older style solid-state two-metre FM transmitter/receiver, on air tests showed that there was noticeable output on 216 MHz.



Two-metre Transmitter — Typical of Popular Home-Brew Designs.

This is 'spot-on' on channel 11 (our local television translator output), which caused television interference when transmitting.

The 216 MHz output was of a low level but it still caused problems in the local area. The unwanted output was a result of the transmitter's design for no filtering was provided in the output stage — this situation is not uncommon amongst some simpler transmitter designs.

SOURCE OF PROBLEM

The 216 MHz output is a result of the third harmonic output of the 72 MHz stage; ie the 72 MHz signal is doubled to give a desired 144 MHz output, but some tripling to 216 MHz also takes place.

(This problem is a common result of excessive drive applied to the doubler stage. It is always good practice to include a series resonant trap at 3xf across the input of PA — Technical Editor).

SOLUTION TO PROBLEM

Two possible solutions were considered:
(a) re-design of the PA-stage to further suppress unwanted output
(b) add an external bandpass filter to reduce out of band signals.

Not wishing to alter the design of the transmitter as in (a) (with the possibility of introducing more complex problems) it was decided to choose alternative (b) — design a suitable 'out-board' filter. This choice was also chosen as, having built very simple two-valve type transmitters (Mini Tran 2 — March 1962 AR), the filter could also be used to "clean" this up also.

After studying the various alternatives, I finally settled on the coaxial cavity type, as described in various ARRL publications, but modified to suit locally available materials.

DESIGN

The design is shown in the accompanying diagrams — note the use of older imperial measurements — this was done as older copper pipe was used having imperial dimensions.

The diagrams should be self-explanatory. All rods and half-inch pipe are soldered to the brass cap. The capacitor C1 is fitted between the outer and inner pipe. It also provides support for the top of the inner pipe so the use of a mechanically strong ceramic insulator is not required. Whilst on C1, use a type with a lockable shaft or stiff movement as this sets the passband and should be 'bump' proof.

(The Q of the filter is high and, as such, minor variations in C will cause a significant variation in the resonant frequency of the filter — Technical Editor).

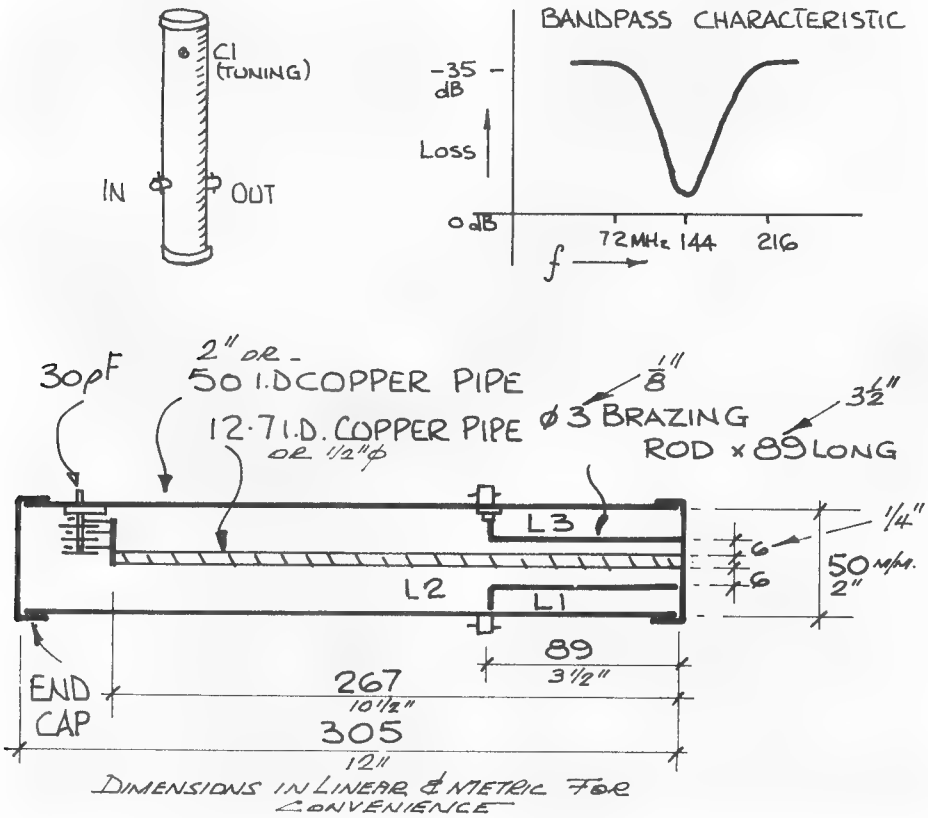
ON AIR TESTS

The filter was connected between the transceiver and antenna and peaked to give maximum transmit output power to the antenna. There was no noticeable change in signal reports given with the filter in-line or removed from circuit.

A portable colour television was placed near the transmitter and channel 11 selected. With the filter out, the television was overloaded and the received program totally lost. When the filter was connected, the television showed no signs of interference — thus the problem was solved.

Running one watt of transmit output power with the two-metre and television antennas ≈ one metre apart only slight interference occurred. This also happened with a commercially built transmitter, so pure front overload of the television (a mid-range Japanese model) is suspected.

REFERENCES:
QST, 1964 — ARRL
Amateur Radio Handbook 1976 — ARRL



Coaxial Cavity Filter for the Two-Metre Band.

DECISION APPEAL

Jack Ravenscroft VE3SR, has decided to appeal the Ontario District Court decision that put him off the air and forced him to pay damages and costs for allegedly interfering with the operation of electrical and electronic equipment in a neighbour's home.

Although no additional court appearances will be involved, the appeal process will take many months and cost many thousands of dollars.

From *CRRL News* April 30

BUYING OR SELLING GEAR?

HAMADS

MAKE IT HAPPEN FAST

SMALL SIGNAL BJT AMPLIFIERS

Don Law VK2AIL
RMB 626, Adelong Road, Tumblong, NSW. 2729

How to use the BJT from square-one without resorting to copying a design.

Although a vast number of Bipolar Junction Transistors (BJT) have disappeared into one or another form of *chip* it is still easier to build say, a microphone preamplifier or whatever, with a BC109 than to reach for a 741 op-amp.

This article describes how to use the BJT from square-one without resorting to copying someone elses design. Since thermal runaway problems went out with germanium devices, a simple circuit as described in Figure 1 may be used.

(In any event, providing that when

$$V_c = V_{cc}/2$$

the collector dissipation is within the manufacturers rating, thermal runaway cannot occur because whether V_c increases or falls from this value P_c reduces.

$$P_c = V_c \times I_c$$

Work it out for yourself).

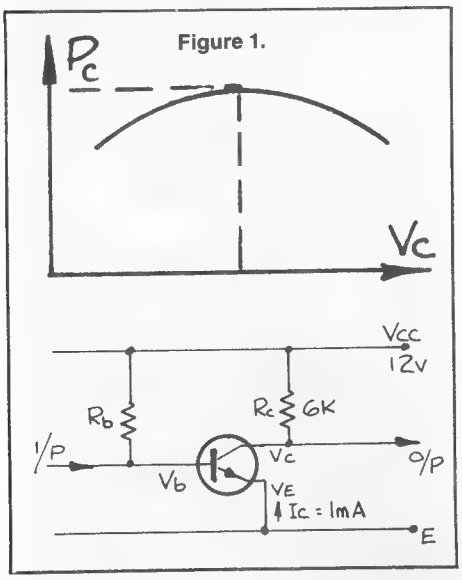


Figure 1.

It is usual to arrange for the collector current (I_c) to be around 1 mA. (The manufacturers beta spread and other data are usually given at this current). To obtain the maximum undistorted voltage output swing, R_c is calculated to drop half the supply voltage, V_{cc}. Thus with a 12 volt supply:

$$R_c = (V_{cc}/2) / I_c = (12/2)/1\text{ mA} = 6\text{k}$$

R_b is found by experiment and may vary between 270k and 1M or more. The voltage gain (A_v) is quite high and is found by dividing a magic figure (26 to 30 mV) by I_c (mA) and then dividing the result into R_c.

ie 6000 divided by 30/1 = 200

This is the 'unloaded' gain. When coupled to another circuit the effective value of R_c and hence the gain is lowered by the input Z of the next stage being in parallel with R_c.

Figure 1 is quite adequate for a one-off amplifier but suffers the disadvantage that a replacement device in the event of failure would be unlikely to have the same beta so R_b would have to be re-selected also.

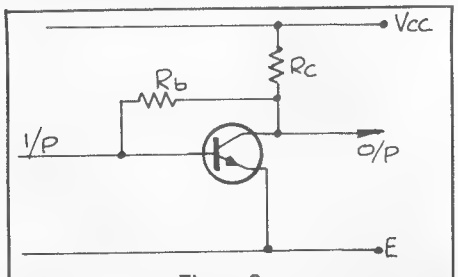


Figure 2.

Figure 2 largely overcomes this problem by providing a large degree of self-adjustment due to DC negative feedback. A BJT with a higher beta would have a lower collector voltage were it not for the fact that less voltage across R_b reduces I_b which in turn reduces I_c thus V_c tends to stay where it was, and vice-versa.

Some AC negative feedback occurs but because R_b is large compared to the base input impedance, the voltage gain is almost that of Figure 1.

Where a fixed, low order gain is required, Figure 3 may be used. That is a line amplifier for a microphone with a gain of 10.

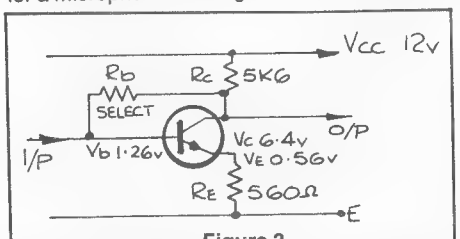


Figure 3.

Here the gain is 'built-in' and is the ratio of R_c/R_E. An added advantage is the reduction of distortion due to negative feedback via the unbypassed emitter. It may also be advantageous that the input Z is considerably increased; ie as before:

$$A_v = R_c \text{ divided by } 30\text{ mV}/I_c\text{ (mA)}.$$

(The latter quotient is called little re) but in Figure 3 the value of big R_E must be added:

ie $A_v = R_c / (re + R_E)$ but because R_E is large compared to re,

$A_v = R_c/R_E$ is near enough.

In both Figures 2 and 3, R_b will only be half the value of Figure 1 because the voltage across R_b is halved.

The voltage across R_c, the BJT and R_E should be arranged so that V_{Rc} and $V_{c\text{-}E}$ are approximately the same. For a 12 volt supply and I_c = 1 mA the values given are satisfactory.

Figure 4 is the full blown beta independent arrangement which, once designed, is guaranteed to work with any transistor of that type out of the box.

Three bits of information are necessary: ie a BC109.

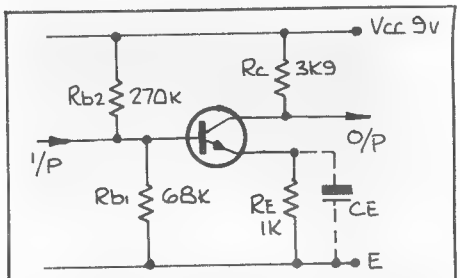


Figure 4.

1. V_{cc} . . . say 9 volts (your choice)
2. I_c . . . say 1 mA (your choice)
3. Beta . . . say 400 (manufacturers data)

There is no reason why V_E should or should not be about one-tenth of V_{cc}.

Since R_E will be sufficiently large to compensate for beta variations (between devices) and because one-tenth of V_{cc} will not be missed, this proportion seems sensible. At I_c = 1 mA and because I_b is so small, $I_E = I_c$ (near enough).

$$\text{So } R_E = V_E/I_E = \text{say, } 1\text{V}/1\text{mA} = 1\text{k}$$

This leaves 8V across the BJT and R_c so R_c must drop 4V DC.

$$R_c = 4\text{V}/1\text{mA} = 4\text{k}$$

Using the lower value of the beta spread (400 to 800) makes

$$I_b = I_c/400 = 2.5\ \mu\text{A}$$

Since the 'bleed' current through R_{b1} and R_{b2} must be large enough to stabilise the base voltage (V_b) a value equal to I_b x 10 is chosen. (Lower currents may be economical when using battery power but beta independence may suffer. Higher values, and lower resistor values may unnecessarily lower the input impedance of the circuit). Thus

$$I_{(Rb1 + Rb2)} = 25\ \mu\text{A and } (R_{b1} + R_{b2}) = 9\text{V}/25\mu\text{A} = 360\text{k}$$

There are several ways of calculating the voltage divider but the simplest is probably by proportion; ie

$$R_{b1}/R_{b1} + R_{b2} = V_b/V_{cc}$$

or

$$R_{b1}/360\text{k} = 1.7/9\ (V_b = V_E + 0.7 \text{ for Si})$$

By cross multiplication:

$$R_{b1} = 1.7 \times 360\text{k}/9 = 68\text{k}.\ R_{b2} = 360\text{k} - 68\text{k} = 292\text{k}$$

The preferred values given in Figure 4 will not adversely affect the operating parameters. With R_E unbypassed A_v = 3.9. A_v with R_E bypassed is approximately

$$R_c/re = 3900/30 = 130.$$

Calculations using different data are an interesting and rewarding exercise and it is a worthwhile project to program the computer for quick results. You will find, for instance, that varying R_c has little effect on I_c, (unless it is so high that the BJT is 'bottomed'; ie V_c is too low; one or two volts), a popular misconception. Why should it, looking back into the collector you have an extremely high Z. (A NiCad charger maybe? A constant current source).

Achieving maximum gain is also a giggle. For

very small signals (out) V_c may be lowered; ie R_c increased but if you want the full O/P swing with V_c near $V_{cc}/2$ then you will have to reduce I_c also. Since $A_v = R_c/re$ and because re = 30 mV/Ic you will find it quite a battle. Increasing R_c and V_{cc} (and modifying the base voltage divider) will produce greater gain but do not exceed the makers maximum V_{cc}.

Input Z is $R_{b1}//R_{b2}//R_{base}$ and since R_{base} = beta x re = 12k then R_{b1} (in particular) does not seriously reduce the I/P Z.

Output Z is 3k9 unloaded but nearer 2k7 when coupled to a similar stage.

A_v would then be 2700/30 = 90.

You will also find that beta variations make no difference to calculated values of R_c and R_E but cause changes in base divider values and, of course, I_b and I/P Z.

In conclusion, these are 'small' signal amplifiers and whilst they are okay for microphone amplifiers, they will severely distort a crystal pick-up output unless a series resistor of some 330k in the base signal circuit is included. Good Luck!

ar

DEVELOPMENT OF TELECOMMUNICATIONS

△ In 1945, there were 41 million telephones in the world. The total today is 668 million — an increase of 1500 percent or seven percent per year over 40 consecutive years. As new services develop — telefax, data transmission, teleconferencing and others — there are no signs yet of a slowing down of this growth.

However, it is interesting to note that three quarters of the world's telephones are located in eight countries only, and the developing countries with 70 percent of the world's population are using only seven percent of the telephones.

From *Telecommunication Journal* — Vol 53, IV/1986

SATELLITES IN BUSINESS

△ Satellites are not only changing the face of broadcasting, they are also changing that of business. Today, major growth is occurring in the United States market for private satellite networks, and a number of satellite systems specifically designed to service the telecommunication requirements of business have been developed.

Annual sales of private satellite network earth stations are now estimated at US$315 million.

Private satellite networks offer business voice, data, facsimile, and audio and video teleconferencing services.

From Telecommunication Journal — Vol 53, IV/86

CHIP PERFORMS UP TO 48 MILLION OPERATIONS PER SECOND

Philips is launching a 2 μm, single-chip, CMOS Digital Signal Processor (DSP) capable of eight million instructions per second (8 MIPS) and up to six concurrent operations in each instruction — an equivalent total of 48 million operations per second.

The high throughput of the PCB5010 results from a highly parallel, pipe- lined Harvard architecture consisting of two 16 bit data buses and five functional sections all working in parallel. The new DSP offers a short instruction cycle time of 125 ns.

from *Electronic News*, June 1986

ENERGY RATINGS

Refrigerators and freezers sold in Victoria will have to be labelled indicating their rating of power usage. The labels have from one to six stars — the more stars the more energy efficient is the appliance.

The scheme applies to refrigerators from December 1986 and freezers from March 1987.

MODIFYING THE AZDEN PCS-4000 FOR A 5/25 kHz STEP RATE

David Horsfall VK2KFU
PO Box 257, Wahroonga, NSW. 2076

The Azden PCS-4000 is a popular two metre transceiver but it lacks provision for a step/scan rate of 5/25 kHz.

The Azden PCS-4000 is quite a popular two metre transceiver, allowing a good deal of control from the front panel and the microphone. One thing that it lacks, however, (in common with many other rigs, I hasten to add) is the provision for a step/scan rate of 5/25 kHz, as opposed to the 5/10 kHz supplied as standard.

It seems that Australia is one of the few countries in the world utilising a 25 kHz channel spacing on the two metre FM sub-band, however the PCS-4000 is remarkably easy to modify in this regard. All that is required is a signal diode (1N914, etc), a bit of wire, a fine-tipped soldering iron and plenty of patience!

Reference to the circuit diagram shows that it is simple to convert the 10 kHz rate to 25 kHz. All that is required is a link between the "K3" and "R5" scanning lines as well as between "K1" and "R5" when the "STEP" button is depressed. Refer to Figure 1 for the Truth Table. It should be mentioned at this point that despite the apparent complexity of the control panel, very few functions are "hard switched" — which is to say that most functions are accomplished by scanning various control lines with suitable decoding firmware.

Figure 1 — "Step" Truth Table.
1 — Diode In
o — Diode Out

	R5							
Step Rate kHz	5	10	12.5	15	20	25	40	50
K3	o	o	o	o	1	1	1	1
K2	o	o	1	1	o	o	1	1
K1	o	1	o	1	o	1	o	1

CONSTRUCTION DETAILS

Remove the top and bottom covers, thus allowing the front panel to be removed. Most of the "body" is taken up with the RF section, with the microprocessor living just behind the front panel. The knobs are easily pulled off, allowing the front panel to slip off. There is a small board containing the three switches (STEP; SCAN and TONE) that can now be unscrewed. Try not to lose these tiny screws in the interior of the rig — it is embarrassing having to turn it upside down and shake it! Besides, they can do nasty things should they happen to contact the internal battery . . .

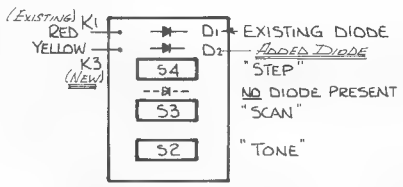


Figure 2 — Switch Board.

Referring to Figure 2, it can be seen there are vacant holes for extra diodes; currently only "D1" is installed. The modification is simplicity itself. First, insert an extra diode (1N914 or similar) in the "D2" position. It faces the same way as "D1" does.

Next, take a short length of wire from the "free" end of the diode to any "K3" point. A suitable location is on the back of the memory switch; the yellow wire is a "K3" scan-line. See the circuit diagram in Figure 3.

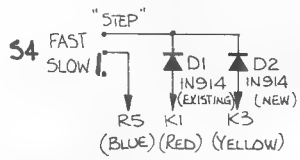


Figure 3 — Circuit Diagram.

Beware: the yellow wire on the switchboard is ***not*** a "K3" line. Also the circuit diagram has a mistake — the line shown as "K5" on the memory switch "SW1" is actually "K3" — the one we want.

With this being done, the unit may now be tested and then reassembled. The STEP switch will now give 25 kHz stepping when depressed, resulting in much quicker band-scanning and frequency selection. It will not increment the megahertz digit when stepping, but hopefully this will be the subject of a future article.

We have been unable to locate a schematic circuit for this transceiver, so we are unable to check all of the details — Tech Ed.

QSP

CORDLESS TELEPHONES

Some unapproved cordless telephones can cause harmonic interference, usually in the 3.500 MHz amateur band.

If you have such problems, identify the users name and telephone number by monitoring, then advise your state DOC office.

Prompt action is assured.

DC86 DIRECT CONVERSION RECEIVER

Novice Notes

FOR EIGHTY METRES

Drew Diamond VK3XU
Lot 2, Gatters Road, Wonga Park, Vic. 3115

Last month, the principles of operation of a Direct Conversion (DC) receiver were outlined, with the promise of a construction article to follow. Following is the construction details.

PERFORMANCE

Frequency Range:
3.5 to 3.7 MHz.
Reception Modes:
CW, SSB, DSB, AM (as DSB) and RTTY.
Sensitivity:
0.4 μV for 10 dB S+N:N.
Selectivity:
50 dB down at 100 Hz, 45 dB down at 10 kHz.
Spurious Responses:
None.

This is not a simple "Mickey Mouse" project, but a serious attempt at a receiver of more than adequate performance. My guess is that the circuit is a little more complicated than expected. This is because satisfactory performance cannot be obtained with just the handful of components needed for a 'bare bones' DC receiver. Sure, we could hear signals on something made up of a dual-gate FET product detector, a one- transistor VFO and a high gain audio amplifier. Unfortunately, such a receiver would be sadly lacking on all points. I have made receivers like this, and they always prove disappointing. Strong signals 'swamp' smaller ones, the VFO pulls (varies in frequency) on strong signals, selectivity is poor, and hum can be a problem where mains wiring is nearby.

This project is based upon the receiver I described in *Amateur Radio* for March '84. As only one band is required in this instance, the design is greatly simplified by the omission of the frequency divider board. The audio board is used again here without change. In addition, factory-made printed wiring boards (PWBs) are available for this project, offering an added incentive to would-be constructors.

CIRCUIT

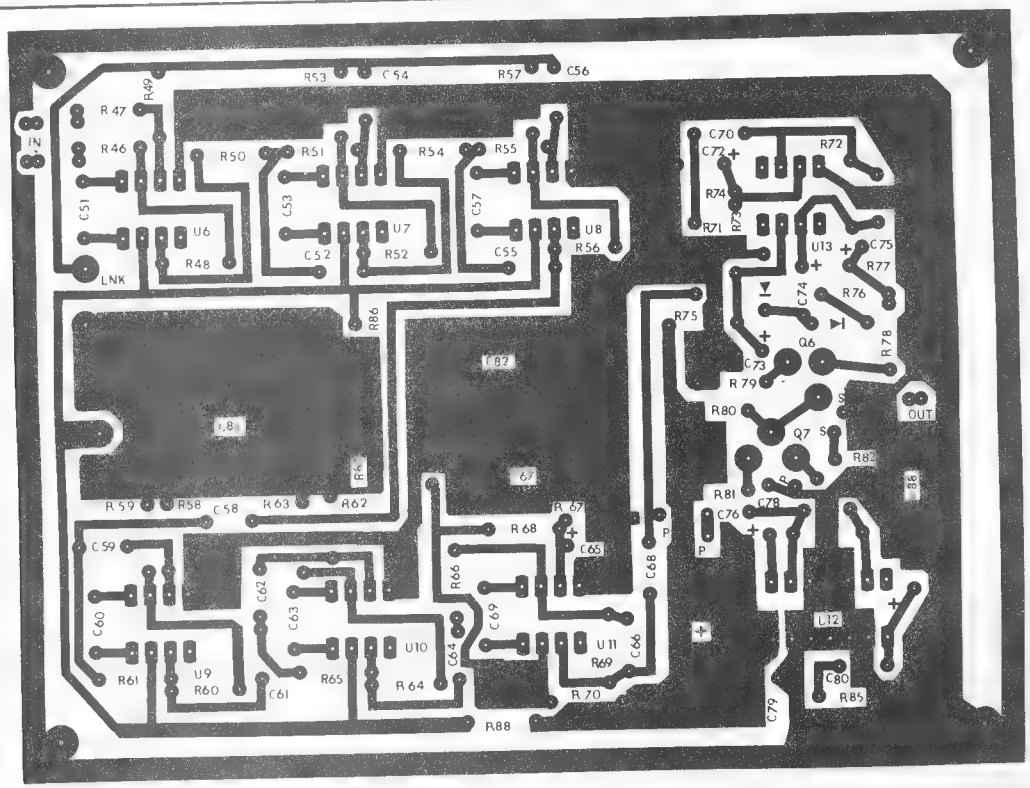
To prevent overload, only the band of interest; 3.5 to 3.7 MHz, should be presented to the input of the RF amplifier. L1 and L2, tuned by C1 and C3 form a top-coupled empirically designed band pass filter. An RF gain control R1 (an attenuator really) is provided so that overly powerful signals may be reduced to an acceptable level.

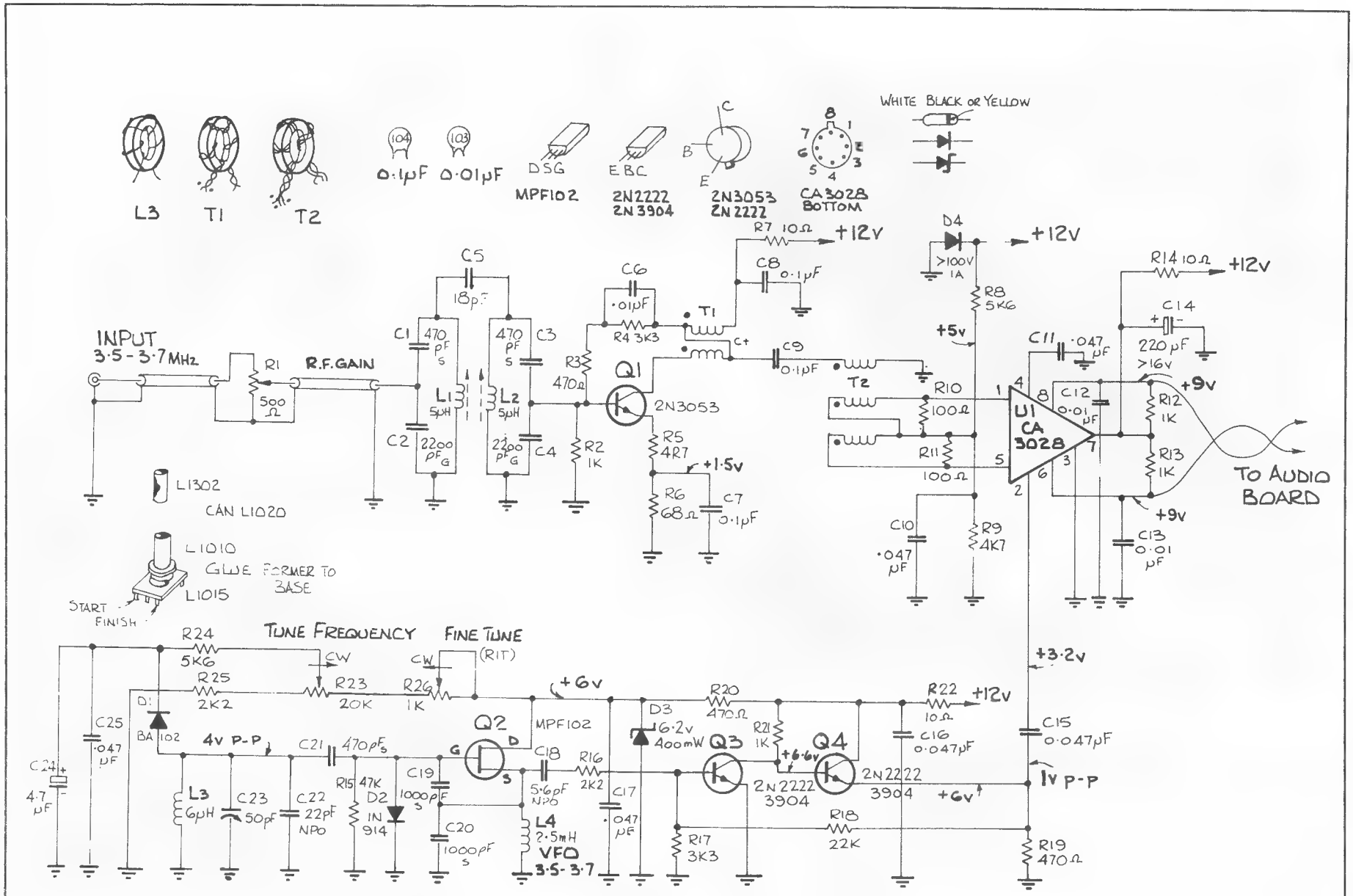
The broadband RF amplifier at Q1 is a popular favourite. This amplifier is a 'strong' one, with feedback and a hefty small-signal transistor (2N3053 or 2N5109, etc), not easily overloaded by strong signals. Such an amplifier would still be operating linearly long after a FET or dual-gate FET had reached its limit of linearity. About 10 dB of gain is provided. Noise performance is not particularly good, but on 80 metres, man-made and atmospheric noise will, in practice, obscure any noise contributed by this stage.

The active product detector is also a favourite. It is singly balanced, in that the input signal is applied to the differential input in push-pull at pins 1 and 5 of U1, a CA3028 current sourced differential pair, and VFO energy, at or near the frequency of the incoming signal is applied to the base of the current source transistor of U1 at pin 2. The sum and difference products are available at pins 6 and 8. R12 and R13 provide a balanced load, across which the difference frequency (audio) is established. The sum products; about 7 MHz, are suppressed by C12 and C13.

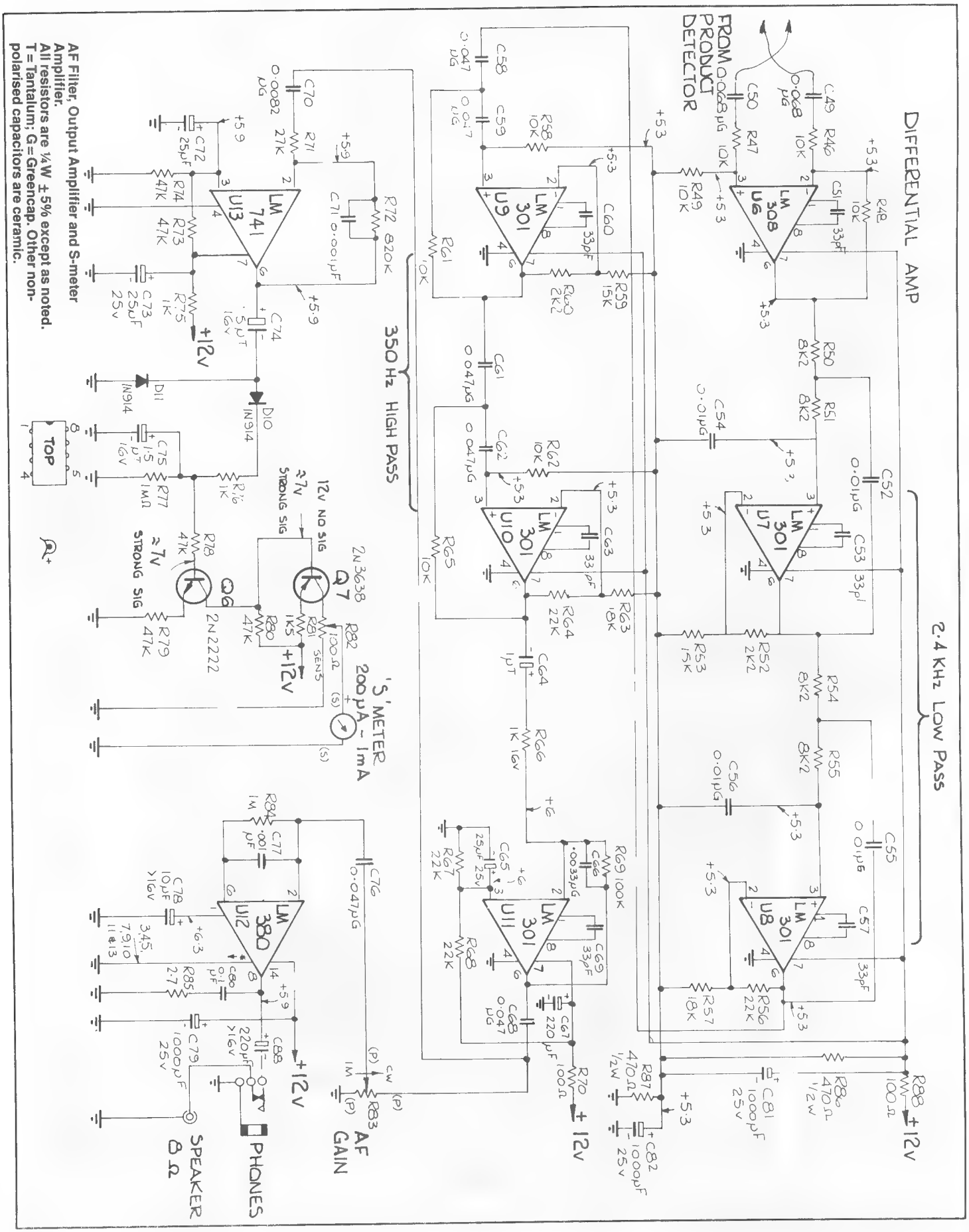
A Colpitts oscillator VFO at Q2 tunes from 3.5 to 3.7 MHz. As variable capacitors are becoming increasingly difficult to obtain, a common varicap diode, type BA102 at D1 is employed to vary the VFO frequency. The required capacitance variation, about 60 pF, is affected by R23 (course, or main tuning) and R26 (fine or RIT). So R23 yields about 200 kHz variation, and R26 about 4 kHz. A buffer amplifier at Q3/Q4 supplies about one volt p-p to U1, and isolates the oscillator from any load variations from the product detector — so reducing any frequency pulling effects from strong signals.

The component designations on the audio board derive from the '84 receiver. U6 functions as an interface between the differential output of the detector and the single ended input of the audio filter. It is at the same time a low impedance source for the input RC network at the input of U7. Detected signals are first applied to a 2.4 kHz low pass filter to remove all unwanted higher frequency products. The LPF is a fourth order Butterworth, with an attenuation at 10 kHz of 45 dB. This filter is followed by a fourth order 350 kHz high pass filter to remove unwanted lower frequency products. The HPF section has an attenuation of 50 dB at 100 Hz, so it is possible to resolve SSB, DSB, AM and CW signals with ease, because all redundant low frequencies are removed by the HPF. Power line related noise (50, 100, 150 Hz, etc) is also greatly attenuated. By backing a LPF against a HPF in this manner, a band pass filter is formed. Ringing is not a problem, as each section of the filter is independent of the

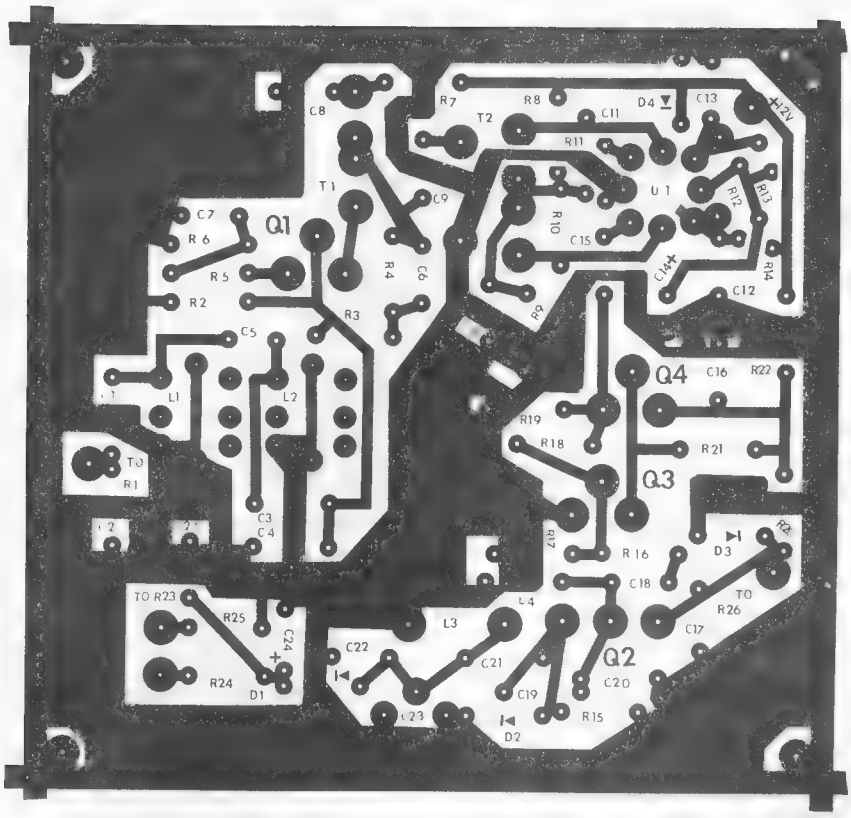




RF Amplifier, VFO, Product Detector.
L1, L2: 28 turns 28 B&S (0.32mm) enam on 5 mm former, F16 slug
T1: ≈ 13 loops 24 B&S (0.50 mm) enam twisted bifilar on Amidon FT50-43 toroidal core
T2: ≈ 11 loops 24 B&S (0.50 mm) enam twisted bifilar on Amidon FT50-43 toroidal core
L3: 32 turns 22 B&S (0.64 mm) enam on Amidon T68-2 toroidal core
S: Styroseal or poly
NPO: 'Negative-Positive-Zero'
G: Greencap Polyester
L4: RFC; 2.5 mH, DS P/N L1824



AF Filter, Output Amplifier and S-meter Amplifier.
All resistors are ¼W ± 5% except as noted.
T = Tantalum; G = Greencap. Other non-polarised capacitors are ceramic.



others. R86/R87, bypassed by C81/C82 provide a centre reference to the plus and minus supplies for the op-amps in the audio filter.

The BPF is followed by an LM301 at U11 with a mid-range gain of about 40 dB, followed by an LM380 at U12 to adequately power speaker or 'phones. AF signal is picked off at the output of U11 and applied to the S-meter amplifier U13. The signal from U13 is rectified, and C75 is charged positively. The time constant of C75/R77 is chosen so that the S-meter reads an average value according to the strength of signal. Liberal decoupling is applied throughout the receiver to prevent instability.

CONSTRUCTION

All components are accommodated upon two PWBs; one for the RF amp/product detector/VFO, and another for the audio BPF/audio amp/S-meter amp. My receiver is assembled in a case measuring 255 x 77 x 155 (WHD) with a removable lid. No doubt the unit could be made much smaller than this. One approach could be to use one of those attractive plastic cases with a bail handle, intended for things like counters. The PWBs could be mounted back- to-back, with a panel between. These cases are fairly expensive however.

The power supply should not be built into the receiver. As can be imagined, with all that audio gain in there, to incorporate a mains power supply is asking for trouble. A suggested circuit is presented here a a guide. Information on power supplies abounds in technical literature, and need not be repeated here. The receiver will work quite happily from 9 volts to about 15 volts, and draws about 100 mA.

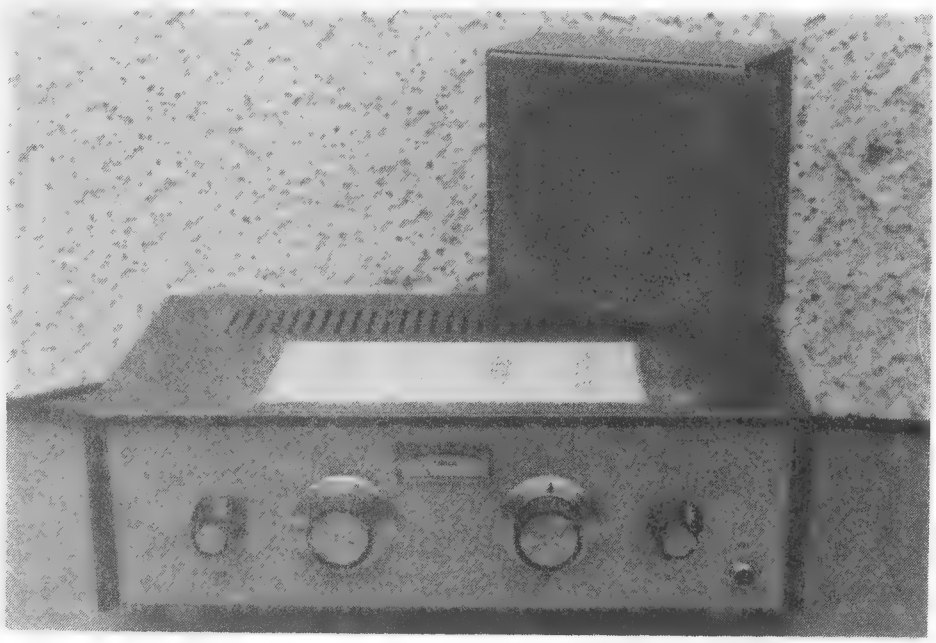
The speaker may be placed inside the case along with the receiver, but spurious resonances and rattles could be a problem. An external speaker gives a much cleaner sound, and this is strongly recommended.

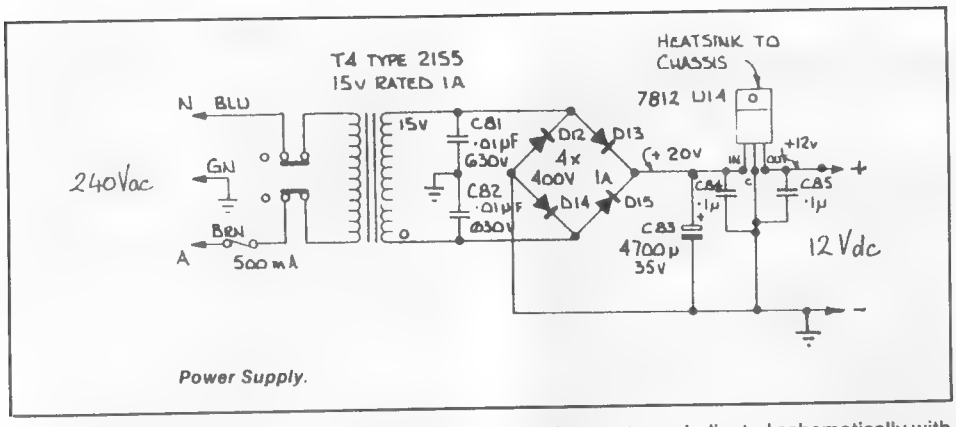
Some sort of readout for frequency will have to be provided. In the past, we would simply have bought one of those *Jabel* or *Eddystone* dials, but now mechanical dials have become horribly expensive and difficult to obtain. This was another factor which indicated the varicap and pot scheme. By using a pot for the tune control, we now get 270 degrees of rotation for our 200 kHz, against only 180 degrees for a variable capacitor. Let me indicate the perceived dial options:

- Two pots, the course pot fitted with a commonly available knob calibrated 0-10, and a lookup table or graph, as in the photograph.
- A 20k, 10-turn pot for R23 fitted with a turns counting dial and a table. This is a costly choice; pot about $10, dial about $30.
- Substitute a capacitor for D1, etc. A 100 pF variable in series with a 150 pF styroseal would be fine. If you have a nice capacitor/drive tucked away somewhere, then this could be just the time to hunt it out.
- Frequency counter. If you want a really classy readout, you could incorporate a frequency counter for the display. It must be well shielded of course. Sufficient signal level exists at the emitter of Q4 for this. *Radio Spares* have a 4-¾ digit counter module; P/N 258-D63 for about $75 if you are keen. Alternatively, if you already have a counter, simply extend the VFO signal to a panel mounted coaxial socket for the counter connection. Take care that there is not excessive 'kick-back' noise from the counter input.

The boards may be assembled and tested in stages. First perhaps, could be the audio board. If the S-meter is not required, all the components associated with this feature may be omitted; ie C70 through to R81. LM741s may be substituted for the 308 and 301s, but they are slightly noisier however. The 33 pF gain compensation capacitors must be left out if 741s are used. With this board assembled, and component locations/polarities checked; 12 volts may be applied. With the AF gain pot fully CW, a small amount of hiss should be heard. A screwdriver blade touched to either input at C49 or C50 should produce an audible buzz. If you want to test this board more fully, a small 2k:2k transformer (not critical) must be interposed between the balanced input and an unbalanced audio oscillator. Remember, the input is balanced, so any serious imbalance could cause the amplifier to oscillate.

Now the VFO, product detector and RF amp board may be assembled. Winding L1 and L2 could be a bit tricky if you have not wound small coils before. First, glue the L1010 formers to the L1015 bases. About 650 mm of 28 B&S enamel wire will be required for each coil. Solder the base end start of the coil into the pin corresponding to the earthy end of the coil (check the PWB), and anchor the free end of the wire in a vice. Screw the F16 slug about half-way into the top of the former. Keeping the wire taut; wind on 28 turns. You will find that the slug will now provide a convenient temporary tying off point for the end of the coil. Wind a good number of turns onto the slug so that they do not lose their tension. The coil must now be coated with some sort of enamel,





Power Supply.

such as nail polish, varnish or shellac to hold the turns in place. When dry, the top end finish may be soldered to the other pin.

T2 is made as follows:

Firstly, the Amidon cores must be coated with some lacquer such as mentioned earlier. This will reduce the possibility of shorts occurring should the wire enamel be scratched during the winding process. Take three 300 mm lengths of 24 B&S enamel wire. Lay them parallel to each other, and twist them together at one end. Clamp this end in a vice. Draw a cloth through the wires to remove any wrinkles. Now twist the free ends together and fix them in the chuck of a hand drill. Whilst keeping the wires taut; turn the drill until there are about three twists per cm. Give the drill a tug to set the twists, then remove the twisted group. Carefully thread the triplet onto your core until there are about 11 loops. Leave about two cm of wire at each end. Remove about one cm of enamel from each wire. With a multimeter set to ohms; locate the 'primary' winding (the one connected to C9). This gets two wires out of the way. Now, take any of the remaining wires and locate its opposite end. Do the same with the third winding. Now connect the start of the second winding to the end of the third winding to form the centre tap ct. Do not solder these, as a pad for each has been provided on the PWB.

T1 is made in a similar manner to T2, but without the primary winding. It is essential that the end of one winding is connected to the start of the other winding to form the centre tap ct. Winding starts are indicated schematically with a dot.

In the interest of frequency stability, styroseal or polystyrene and NPO capacitors must be used where specified. Ordinary ceramic capacitors have a lower Q, and a very poor capacitance versus temperature characteristic.

ALIGNMENT

The VFO frequency must first be set. Three methods are available.

- Connect a frequency counter to the VFO output. Set R26 to mid- range, R23 CCW. Now adjust C23 so that about 3495 kHz is generated. Rotate R23 CW. The frequency should rise to about 3700 kHz. Check operation of R26; it should give about ±3 kHz of adjustment.
- Apply 3495 kHz from a signal generator to the input of the receiver. Set R26 mid-range, R23 CCW. Now adjust C23 until the signal is heard (the signal generator may have to be set to about 50 μV).
- Hook about 30 cm of wire (eg a clip lead) to the VFO output to act as a radiator. Set another nearby receiver to 3495 kHz. Set R26 mid-range, R23 CCW. Now adjust C23 until the VFO is heard on the other receiver.

If, for some reason, the VFO cannot be brought onto the correct frequency; the value of C22 may be altered. A 47 pF NPO would lower the frequency, removing C22 would raise it.

With the tuning range now established, we can now adjust L1/L2. Connect an antenna to the receiver input. Set R1 to minimum attenuation. Set the receive frequency to about 3.6 MHz and peak L1/L2 for maximum signal strengths. This should occur with the slugs well down into the coils.

The S-meter sensitivity pot, R82, may be adjusted when the receiver is up and going. It should be set so that the meter responds to reasonably weak signals, but at the same time does not pin violently when a strong station s tuned in.

TROUBLESHOOTING

Some key voltages are indicated on the circuit as a guide to troubleshooting should this be necessary. A high impedance volt-meter; eg DVM, must be used around the op-amps, otherwise errors will occur. A voltage which deviates by more than perhaps 10 percent from that shown would indicate a fault in that area.

An effect that had me puzzled for some time was instability in the audio section, manifest as a howl from the speaker as the AF gain control approached maximum. After checking for faulty by-pass capacitors, sources of imbalance and so on, suspicion fell upon the CA3028. Touching my soldering iron onto the can made the oscillation increase, whilst cooling it with *Freon* made it stop. I concluded that the CA3028 was indeed unbalanced. Replacing this IC cured the problem.

Please, if after fruitless attempts on your part you cannot locate a problem, write to me about it and I shall extend any reasonable amount of help necessary.

PARTS

Care has been taken to select parts which are, to my knowledge, readily obtainable. The only components which may be difficult for some are the toroids and the CA3028. These are available from *Ian J Truscott's Electronic World,* whose address is given below. The component parts of L1/L2 and the signal meter are available from *Dick Smith Electronics.* If you prefer to buy all your components from one source, a kit is available as follows:

Complete kit of parts, including PWBs:	$95.00
Just 'Bare-Bones' — PWBs, toroids, all semiconductors:	$52.00
Case (as in photograph):	$15.70

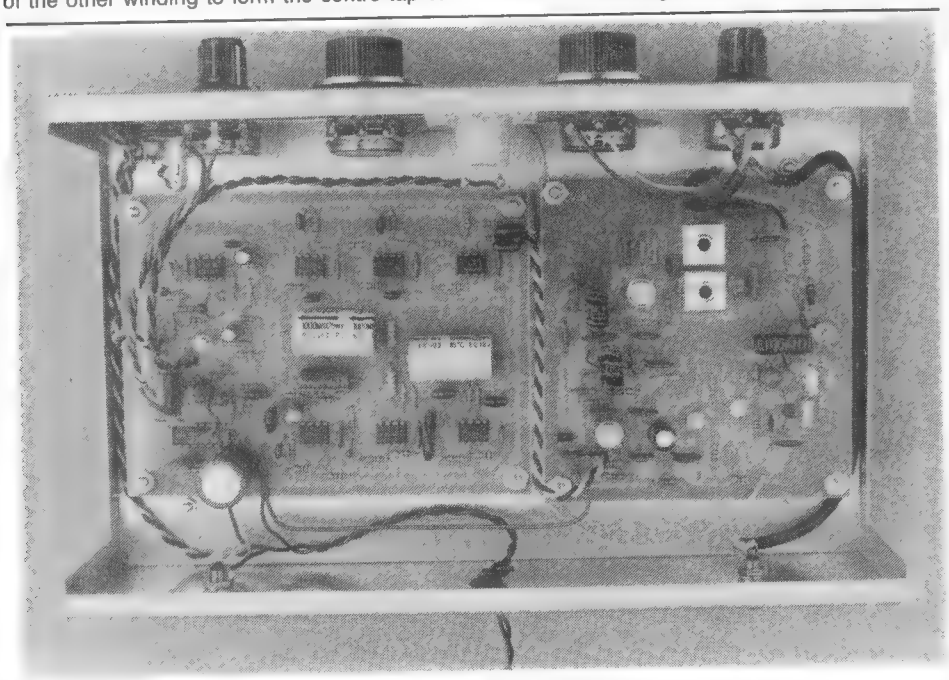
(All prices include postage.

SUPPLIER

Ian J Truscott's Electronic World, 30 Lacey Street, Croydon, Vic. 3136.

REFERENCES AND FURTHER READING

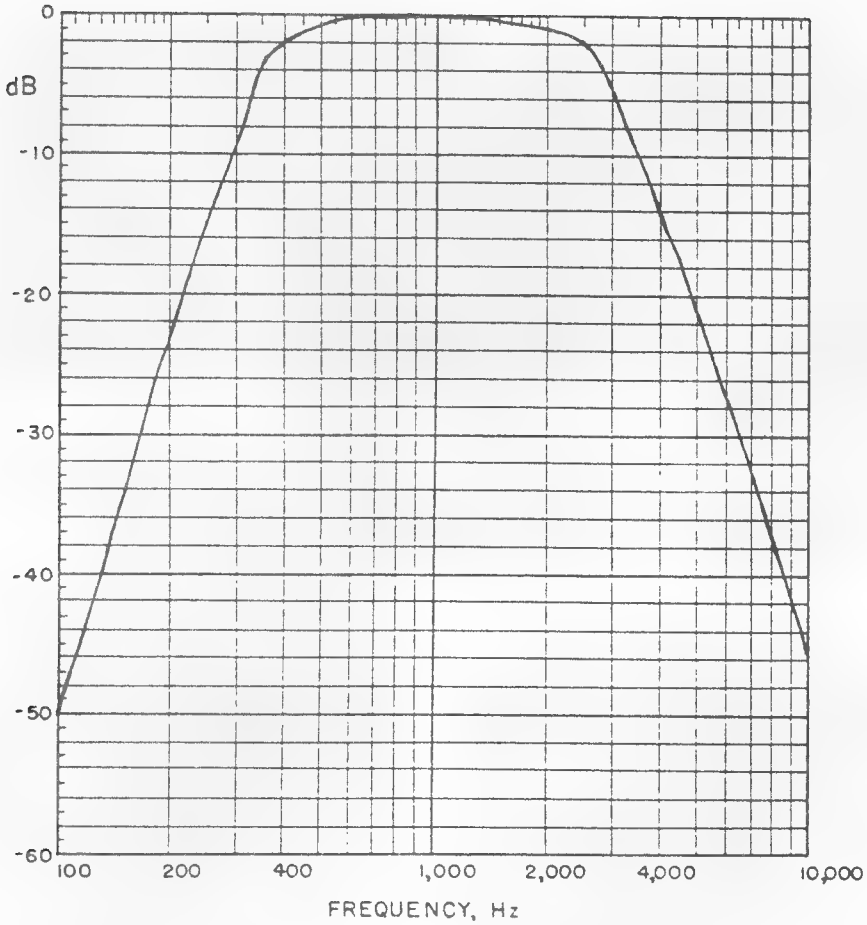
1. Solid State Design for the Radio Amateur — *ARRL*
2. Practical RF Design Manual — *DeMaw*
3. High Performance DC Receiver — *Diamond, VK3XU, AR, March '84*
4. The Design of Active Filters with Experiments — *H Berlin*
5. Direct Conversion CW Transceivers — *Price G4BWE, Rad Comm, Jan '86*



PARTS LIST

RF Amplifier/Product Detector/VFO Board

CAPACITORS	WHERE USED
5.6 pF, >25V, NPO disc ceramic	C18
18 pF, >25V, NPO disc ceramic	C5
22 pF, >25V, NPO disc ceramic	C22
50 or 60 pF trimming capacitor	C23
470 pF Styroseal/ Polystyrene	C1, C3, C21
1000 pF Styroseal/ Polystyrene	C19, C20
2200 pF Greencap/ Polyester	C2, C4
0.01 μF, >25V, disc ceramic	C6, C12, C13



Band Pass Filter Response

0.047 μF, >25V, disc ceramic	C10, C11, C15, C16, C17, C25
0.1 μF, >25V, disc ceramic	C7, C8, C9
4.7 μF, >16V, tag tantalum	C24
220 μF, >16V, PC mount	C14

RESISTORS	WHERE USED
4.7 ohm, ¼W, 5%	R5
10 ohm, ¼W, 5%	R7, R14, R22
68 ohm, ¼W, 5%	R6
100 ohm, ¼W, 5%	R10, R11
470 ohm, ¼W, 5%	R3, R19, R20
1 kohm, ¼W, 5%	R2, R12, R13, R21
2.2 kohm, ¼W, 5%	R16, R25
3.3 kohm, ¼W, 5%	R4, R17
4.7 kohm, ¼W, 5%	R9
5.6 kohm, ¼W, 5%	R8, R24
22 kohm, ¼W, 5%	R18
47 kohm, ¼W, 5%	R15
500 ohm linear (A) pot, ¼" shaft	R1
1 kohm linear (A) pot, ¼" shaft	R26
20 kohm linear (A) pot, ¼" shaft	
R23	

SEMICONDUCTORS	WHERE USED
2N3053/2N5109	Q1
2N2222/2N3904	Q3, Q4
MPF102/MPF103	Q2
CA3028A	U1
BA102	D1
1N914/1N4148	D2
6.2V, 400 mW zener	D3
>100V, 1A diode	D4

WOUND COMPONENTS

Former; 5 mm; DS P/N L1010	L1, L2
Slug; F16; DS P/N L1302	L1, L2
Base; DS P/N L1015	L1, L2
Can; DS P/N L1020	L1, L2
Toroidal Core; Amidon T68-2	L3
RF Choke; 2.5 mH, DS P/N L1824	L4
Toroidal Core; Amidon FT50-43	T1, T2
1m #22 B&S (0.64 mm) enam wire	L3
2m #24 B&S (0.5 mm) enam wire	T1, T2
2m #28 B&S (0.32 mm) enam wire	L1, L2

Audio Board

CAPACITORS

33 pF >25V disc ceramic	C51, C53, C57, C60, C63, C69
0.001 μF (1000 pF) >25V disc ceramic	C71, C77
0.0033 μF >25V disc ceramic	C66
0.0082 μF Greencap	C70
0.01 μF Greencap	C52, C54, C55, C56
0.047 μF Greencap	C58, C59, C61, C62, C68, C76
0 068 μF Greencap	C49, C50
0.1 μF >25V disc ceramic	C80
1 μF >16V tantalum	C64
1.5 μF >16V tantalum	C74, C75
10 μF >16V tantalum	C78
25 μF (or 22 μF) PC mount electrolytic	C65, C72, C73
220 μF >16V electrolytic	C67, C88
1000 μF 25V electrolytic	C81, C82
1000 μF 25V PC mount electrolytic	C79

RESISTORS

2.7 ohm ¼W 5%	R85
100 ohm ¼W 5%	R70, R88
100 ohm trimpot	R82
470 ohm ½W 5%	R86, R87
1 kohm ¼W 5%	R66, R75, R76
1.5 kohm ¼W 5%	R81
2.2 kohm ¼W 5%	R52, R60
8.2 kohm ¼W 5%	R50, R51, R54, R55
10 kohm ¼W 5%	R46, R47, R48, R49, R58, R61 R62, R65
15 kohm ¼W 5%	R53, R59
18 kohm ¼W 5%	R57, R63
22 kohm ¼W 5%	R56, R64, R67, R68
27 kohm ¼W 5%	R71
47 kohm ¼W 5%	R73, R74, R78, R79, R80
100 kohm ¼W 5%	R69
820 kohm ¼W 5%	R72
1 Mohm ¼W 5%	R77, R84
1 Mohm C taper pot	R83

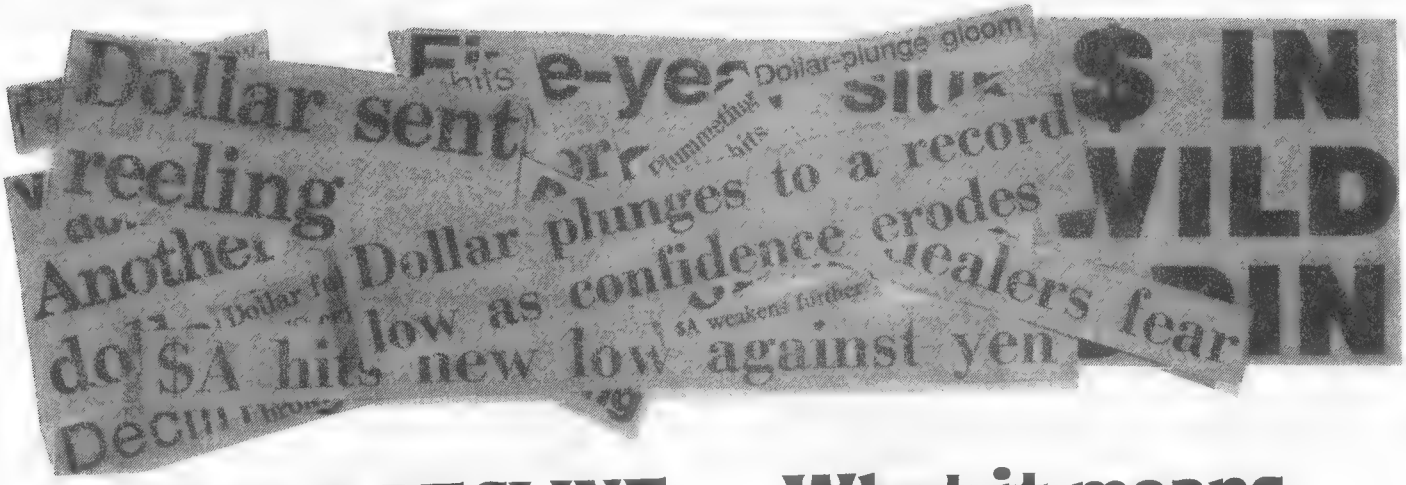
SEMICONDUCTORS

1N914/1N4148	D10, D11
2N2222/2N3904	Q6
2N3638	Q7
LM308	U6
LM301	U7, U8, U9, U10, U11
LM741	U13
LM380	U12

Hardware

Case, 255 x 77 x 155, large knobs; one calibrated 0-10 (2 required), small knobs (2 required), signal meter; 250 μA; DS P/N Q2100, input connector, headphone socket, speaker socket, screws (8 required), nuts (8 required), spacers (8 required), hook-up wire, small 50 ohm coaxial cable (300 mm), (Speaker; not supplied in kit).

"Two of your QRP friends to see you, dear . . ."
—Cartoon courtesy *The Short Wave Magazine*, March 1986



DOLLAR DECLINE — What it means

Jim Linton VK3PC
4 Ansett Crescent, Forest Hill, Vic. 3131

A look at the dramatic drop in the value of Australia's dollar, and its impact on amateur radio. Some of the people in the industry, which imports or makes equipment for radio amateurs and other communications/electronics enthusiasts, have been interviewed and their thoughts on the current economic situation give an up-to-date insight into the industry.

The newspaper headlines say it all — the bottom has fallen out of Australia's dollar on the foreign exchange markets. This has come about because, internationally, our dollar has been devalued, due to this country's balance of trade situation, rate of inflation, unemployment, level of overseas debts and other economic factors.

Most amateur radio equipment is imported from Japan and the dollar has taken a nosedive against the Japanese Yen, which is currently one of the world's strongest currencies. About 12 months ago, currency exchange was 160 Yen to the Australian dollar, but the exchange is now in the low 90s — a decline since January of about 35 percent.

A typical Japanese transceiver costing about $399 12 months ago, now sells for $649, a 60 percent increase, and industry sources predict further price increases.

The pricing structure which determines the retail price of equipment is too detailed to be fully explained in this article, however, there is a price chain before the consumer. This starts with the price of equipment in Japan, the freight to Australia, Customs Duty and Sales Tax. The retailer adds a mark-up to cover overheads — the level of which depends on various factors including competition in the marketplace and what the market can stand.

With landed prices so high, and rising because of the exchange problem profits are low and some retailers, who find themselves out of stock, are often unable to quote a firm price to the buyer. This is due to the unknown fortunes of the Australian dollar or whether there is a price rise just hours away.

DICK SMITH ELECTRONICS

The high price of new equipment is seeing a rival in home- building. Dick Smith Electronics (DSE) is one to move in and provide kits aimed at radio communication enthusiasts. DSE General Manager for Technical Products, Garry Crapp VK2YBX, says the situation "forces people back to building equipment."

The Company has produced a large number of kits over the past few years. There has been a string of 18 DSE kits including the VHF Commander transceiver, UHF Explorer transceiver, a HF transceiver, power meter kits for VHF and UHF, a direction finder, 100 watt linear amplifier, 13.8 volt 15 amp DC power supply preamplifiers, computer interfaces, frequency counters and antenna kits. Next will be a packet radio kit, combining the computers with amateur radio. Considerable savings can be made by the consumers constructing their own equipment.

DSE have evolved kits which require only a screwdriver and soldering iron. Garry says he is committed to seeing that kits are developed to meet the needs of enthusiasts. He says: "It's not a matter of saving money but of getting back to home-brewing."

He says this activity as far as amateur radio is concerned can be considered as a service rather than a business activity, at least during the present economic climate.

AMATEUR RADIO MAGAZINE KIT PROJECTS

Another success with kits has been the 80 metre transmitter by Drew Diamond VK3XU. The same is expected for the 3.5-3.7 MHz 80 metre direct conversion receiver described elsewhere in this magazine. These kits are available from Ian J Truscott's Electronic World.

The technician with this retailer, Ron Van Bremen says Drew approached Truscotts to see if they were interested in sourcing his transmitter kit and marketing it. The exercise has been successful so far with in excess of 50 kits being sold and mail order inquiries still arriving.

Mr Van Bremen says: "If the transmitter kit is any indication the receiver kit should take-off.

"The good thing about the transmitter kit is that you can get on the air with a few watts for about $25, if you provide your own case. The receiver kit is more complex and will be slightly dearer in price."

BAIL ELECTRONIC SERVICES

Bail Electronic Services has been an authorised agent for Yaesu equipment since 1963. This company spearheaded the importation of Japanese transceivers and other communications equipment into Australia and was successfully run by the Bail brothers, Fred and Jim, until 1979.

Known as "Bails," it was sold to Stan Roberts VK3BSR, after the death of Fred Bail.

Stan, a radio amateur for 38 years, has spent all his life in communications, including being a PMG engineer. He runs the importing and servicing business from Wangaratta in north-east Victoria.

Commenting on the exchange rate problem, he says: "It's virtually doubled the price of equipment over the past 18 months. It's obviously had an effect — I don't know what I should order because people can't afford the new prices."

Stan says, for example, that the last time he advertised the FT-980 late last year, it was selling for around $1900-1950. The same thing is now going to cost in excess of $4000. What radio amateur can afford that sort of money?

The downturn has forced him to retrench one technician in August.

Stan says what should concern people is, if the likes of Bail Electronic Services disappears from the amateur scene it will leave a hole in the availability of equipment maintenance.

Bails can be likened to the now extinct corner grocery store, where service and advice were paramount — totally different to the modern supermarket merchandising approach.

Bails has a good reputation throughout Australia and customers, both amateur and commercial, ship their equipment for service from all corners of the country.

EMTRONICS

The dollar crisis has meant an expansion of its manufacturing section for Emtronics, whilst still maintaining its import and retailing activities.

Company Director, Elizabeth Breznik, says she cannot predict anything but a further deterioration in the exchange rate for a short time to come. Despite the economy, she says the family business has had a "climbing upward trend in turnover — we've actually done better this year than last — close to a 30 percent increased turnover."

Elizabeth says: "The only way to do that is to work as a family — to give more than take — and if everyone in Australia did that things would improve."

This astute business woman is well aware of the Federal Government's current drive to boost Australia's exports and "Buy Australian" campaign because of the country's poor balance of trade situation. Perhaps Emtronics will catch this wave of patriotism which is likely to include some government assistance for those wanting to put Australian products into overseas markets.

Husband Rudi VK2AOT, also a Director, explains that Emtronics is making about nine products, aimed firstly at the Australian market, but with an eye on exports — including into the

Japanese market. These products include an antenna tuner and a cross-needle SWR/Power meter with built-in dummy load.

Rudi's found that when importing this equipment it is too expensive and people won't buy it. A popular imported cross-needle SWR meter now costs about $250 retail in Australia.

Emtronics are starting to make beam antennas and are gearing up for mass production with the aim of exporting most of them to Japan.

Other equipment manufactured by the company include linear amplifiers and regulated DC power supplies. It has already received inquiries from overseas for this equipment.

After business hours, Rudi is concentrating on product design and is convinced there is no need to have a factory to produce equipment. He says that during his buying visits to Japan for the company, he has had a good look at how electronic goods are made in that country. He is now training and sub-contracting people to mimic the "Japanese kitchen industry where sub-contractors get paid for every piece — that is the only way we can compete."

To strictly maintain quality control, every item from the subcontractor will be tested in Emtronics workshops before being sold.

ICOM

Kyoshi Fukushima VK3BZX, Managing Director of Icom Australia, says that, while there is a depressed market for amateur radio equipment, the company has maintained its prices structure since January, as radio amateurs cannot afford the higher prices.

Icom Australia has been operating for about four years and is owned by Icom Incorporated of Japan. Kyoshi says Icom equipment in Australia sells at retail prices "even lower than in Japan."

He says: "We want to keep the price as low as we can — and compete with more features in our equipment. Consumers can shop around and look for quality — it's not only price, but a quality product with more features.

"Icom engineering people are putting a lot of care and effort into keeping costs low — designing with more components to make simple, reliable and better performing equipment in many aspects."

Icom Australia has supported its amateur radio equipment prices through the sale of marine and land mobile equipment, but obviously prices will have to rise in the near future.

KENWOOD

Kenwood Australia, owned by the Trio-Kenwood Corporation of Japan, is in a similar position. National Sales Manager, Sandy Bruce-Smith VK2AD, says Kenwood's turnover has increased dramatically since it stabilised the price of amateur radio equipment since January.

Sandy says: "We're riding it as long as we can, but we have to remain profitable."

He cites prices in Australia as being very competitive with those in Japan. For example, to buy one TS-440 transceiver in Japan and bring it into Australia would cost $1800-$1900. This unit is available in Australia through Kenwood for $1585.

KCC

KCC is a Sydney-based company run by Kay Bruce-Smith, Sandy's wife, and is making inroads into ancillary communications equipment such as dip meters, noise bridges, receiving antenna tuners and line filters.

Kay says the company, which started four years ago, is exporting mainly to the South Pacific. The dip meter is all-Australian except for about three components — a variable capacitor and two transistors.

She says: "Radio amateurs are realising that decent equipment can be made in Australia."

But to produce equipment with intricate moulding and complexity requires a high turnover — so the Japanese, already tooled up for this, will continue their hold on the electronics market.

Commemorative Transmission Marks A CLIMBING OF MOUNT EVEREST IN THE ELECTRONICS FIELD

Jim Linton VK3PC
4 Ansett Crescent, Forest Hill, Vic. 3131

The 80th anniversary of Australia's first land wireless broadcast was commemorated by radio amateurs in Victoria and Tasmania.

At 1 pm on July 12, 1906, the first message was transmitted by wireless telegraphy between Queenscliff, Victoria, and Devonport, Tasmania. This was a communication milestone which bridged Bass Strait to link Tasmania with the mainland.

Exactly 80-years later, Alf Forster VK3AJF and Russell Walker VK3CM, of the Geelong Amateur Radio Club (GARC) huddled in a tent at Golightly Park to communicate with Jim Davis VK7OW, a former WIA north-west branch historian, at Devonport.

It took the GARC team about 60 minutes to set up their station for the prearranged sched on 3.610 MHz. Russell said the anniversary was mentioned at a GARC general meeting and most local radio amateurs were not aware of the historic experiments carried out by the Marconi Company in their local area. He said the site, which was now a football oval, there is a granite cairn which gives details of the first communication in 1906, and lists those who were present. The timber building, used then, has been removed and is now in a state of disrepair on a nearby farm.

During the commemorative transmission, Jim read an old newspaper report which said that greetings were exchanged between the Governor General of Australia and the Governor of Tasmania. He had taken a keen historical interest in the first transmission and explained how the occasion resulted in a half-day public holiday.

Alf VK3AJF (left) and Russell VK3CM, in contact with Jim VK7OW, for a commemorative transmission to mark the 80th anniversary of Australia's first land wireless broadcast.

Photograph courtesy *The Geelong Advertiser*

"Bookmakers took bets that the signal would not come through," Jim said.

There is a cairn at East Devonport to mark the historic spot, and Jim has pictures of the building used for the transmission.

The Marconi Company wanted to sell wireless equipment to the Australian Government and sent engineers to Queenscliff and Devonport to conduct the experiment.

Russell said: "The Marconi Company showed great initiative to spend money and come out to do the experiments.

"It was, of course, a commercial exercise — I think they knew it would work and it wasn't so much an experiment."

He had read up on the event and talked to others about the type of spark equipment and size of antennas used for the transmission. "It was really the pioneering days — a climbing of Mount Everest in the electronics field.

"Experts travelling from the United Kingdom to set up the massive antennas and complex equipment would have cost hundreds of pounds," Russell said. Taking part in the commemorative event made him feel a bond with the wireless pioneers. He felt an increased awareness of the difficulties they had, not only technically, but in convincing others that wireless telegraphy would work.

He said:"Commemorating the transmission was a worthwhile experience and helped make young people aware of the pioneering days."

After the initial commemorative transmission contact, about 18 other stations joined the event.

The WIA 75th Anniversary had stirred many into thinking about the history of our hobby and radio communication. But the 80th anniversary crept up on the GARC, leaving the club with little preparation time.

Russell said he hoped the century of the first land wireless broadcast on July 12, 2006, was "a truer re-enactment" with the involvement of dignitaries. "It would be good to have dignitaries involved — it could make the whole thing more important to the general public."

The 38-year-old said he would like to be at the century commemoration, but considered younger radio amateurs of that time should run the show so they can feel the same bond with the pioneering spirit and carry on the tradition.

QSP

UP, UP AND AWAY!

JAS-1 was launched on August 12, 1986 at 2045 UTC from Tanega- shima Island, along with two other satellites.

JAS-1 was heard on its first orbit over Australia with the beacon on 435.795 MHz. The orbit duration was 120 minutes, typical fast time 20-25 minutes.

Australian amateurs conducted two-way communications using voice on the first day of orbit.

Field Aligned Irregularity (FAI)

This article originates from HB9QQ and was published in Electron *June 1986. It was translated for AR by John Aarsse VK4QA. (Electron is the official journal of VERON).*

During the last few years, various publications have hinted the probable existence f new, and until now, little known or unknown propagation modes on two metres.

As the title indicates, it will deal with a phenomenon caused by the irregularities in the earth's magnetism.

This article will attempt to steer these unknown, but very interesting propagation modes into practical realities.

It is possible that interested amateurs will be able, with minor modifications to their equipment, to make FAI-DX QSOs on 144 MHz. The following information will make it possible for amateurs to recognise the phenomenon and thus be able to conduct a reasonable DX QSO.

PHYSICS BACKGROUND

FAI contacts use a special type of reflecting or bending medium, similar to Sporadic E contacts. The difference is that the medium can be imagined not to be a flat surface, but more as a snake-like pattern along the magnetic force lines.

Experience so far indicates beyond doubt that FAI is concurrent with a given Es situation.

The propagation mechanism can be imagined as an ionisation along the magnetic field lines about 100 kilometres above the earth. The 144 MHz signals are transmitted into the FAI zone and then are "bounced-off" in a very particular angle to the field lines. This area is known as the "scattering area."

Further, it is known that FAI contacts in southern Europe (equal to approximately south Queensland/northern New South Wales) are more prevalent than in northern Europe. As these phenomena are quite complex, no further discussion is possible within the scope of this article.

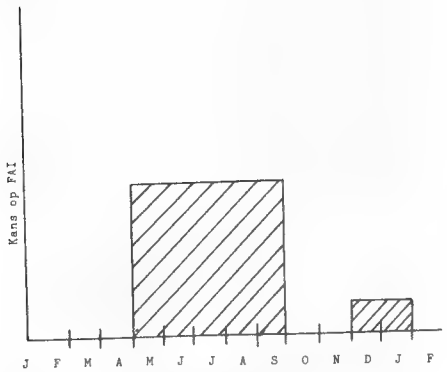


Figure 1 — FAI possibilities during the year.

FAI OPENINGS

As stated earlier, FAI openings are usually possible whenever there are Es possibilities. Figure 1 shows during which seasons it is possible to encounter FAI contacts in the Northern Hemisphere. A similarity with the Es season is evident. But FAI contacts are possible when there are no Es possibilities. Further, FAI contacts were observed after an Es opening.

Because of the fact that so far very few reports have come in about FAI openings, it is not yet possible to give reasonably accurate predictions as to which season is the best. Indications are that May until the end of September appear to be the most productive in the Northern Hemisphere.

Smaller possibilities in December and January have also been observed. But it is clear that FAI contacts should be possible when no Es is recognisable on 144 MHz.

TIME OF FAI

Nearly all known FAI contacts were made between approximately 1700 and 2400 UTC, with a maximum between 2000 and 2400 UTC. (See Figure 2).

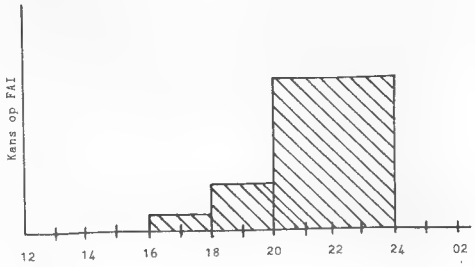


Figure 2 — FAI possibilities time-wise.

CHECKS

To have probable FAI possibilities, Sporadic E propagation should be possible, for instance on 50 MHz. To check for Sporadic E, the following procedures are possible:

— check the 28 MHz band
— check the television channels (48-54 MHz)
— check the east European 70 MHz broadcast band

If, for instance, strong 28 MHz signals are coming from Rumania (YO), one can assume that the FAI "incoming" area is in locator JN 66 (approximately Longitude 12.8 degrees east, Latitude 46.5 degrees north).

If 28 MHz signals are audible from the Crimea, KN 75 (approximately Longitude 34.8 degrees east, Latitude 45.56 degrees north) and one also hears the 70 MHz broadcasts, then one can assume that the FAI entry is around JN 97 (near Budapest). Here again, the positional longitude and latitude of the FAI zone can be decided. In any case, both stations must direct the signals towards the FAI zone and not towards the other station. Further, it should be noted that the reflection is not linear, but follows a half-circle path south of the FAI zone. This small zone is shown by the broken line in Figure 3.

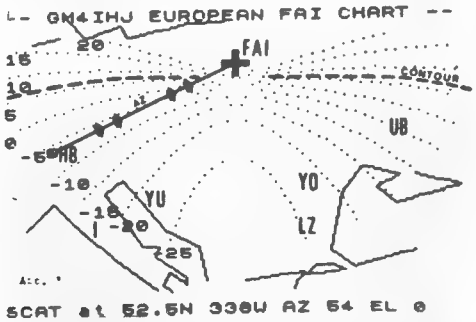


Figure 3 — FAI Zone Format.

The same illustration shows that with a fixed antenna direction of 54 degrees the following contacts are possible: ON, Central Germany, West Poland, UC and UA. It must be understood that the FAI zone position can shift and thus the antenna must follow this direction.

From this example it is clear that FAI propagation is completely different to Es propagation. The most important question is how one has to determine the antenna position in elevation and azimuth.

This information can be evaluated by pinpointing the FAI zone as exactly as possible. This position can then be fed into a computer and the angle can then be shown graphically. (See Figures 3, 4 and 5).

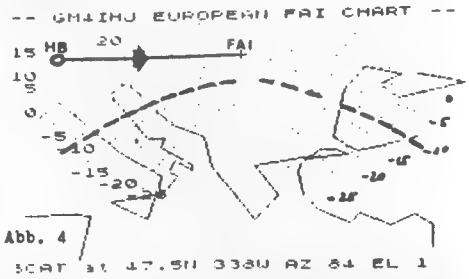


Figure 4 — FAI scatter at 47.5N and 22E (locator KN07XN). Transmitting station located along line +11 and QSO possibilities with stations along line -11. Azimuth 084 Elevation 1.

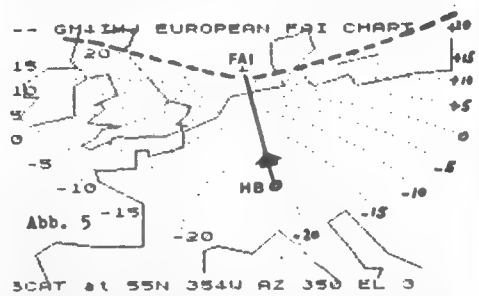


Figure 5 — FAI Scatter at 55N and 6E, locator JO35AA. Transmitting station along line -21 Possibilities with stations along line +21 (GM, OZ, UG).

TECHNIQUES

Experiences so far indicate that a minimal station concept is necessary to achieve representative results. Very important is a relative large antenna system to accurately determine the position of the FAI zone. An excellent array would be a 4 x 11 stacked array. Further, it is essential that the elevation is adjustable. Nearly all the usual receiver preamplifiers are good enough to get a reasonable sensitivity, while about 250 watts on the transmitter side should be sufficient.

OPERATIONS

Usually, FAI signals are very weak and often have a typical sound in the form of flutter or noise, similar to Aurora signals but not as deeply modulated. Because of these problems, most FAI contacts are made on CW. The difference between FAI and Es signals is that FAI signals are usually very weak but are more constant than Es signals.

CONTACT PROCEDURES

It is beyond doubt that FAI is a very interesting propagation mode. The reason why FAI contacts are not too successful up until now is probably due to the lack of specialist experiments in these areas. Also, there is hardly any communication and co-ordination between those interested in FAI in Europe. As a result of this article it is hoped that FAI becomes better known and a start can be made to systematically research FAI as follows:

a) As from April this year, a start was made of systematic tests in certain areas; eg G, EA, F, DL, I, HB, YU, HG, YO, LZ.

Any predictions of FAI propagation will be announced on any of these frequencies: 28.885, 14.345, 3.645 and 144.470 MHz.

b) The proposed times to test FAI openings are suggested to be on the full hour (h+00) and half-hour (h+30), the reason being that it will be impossible to search for a whole hour with the utmost of concentration for very weak signals.

c) For instance, FAI tests can take place on CW between 144.025 and 144.035 MHz and on SSB between 144.150 and 144.160 MHz. The reason for this selection is, that between 144.025 and 144.035 MHz, which is adjacent to the EME segment, hardly any CW traffic occurs. A segment

of maximum 10 kHz width should make it easier to search for active FAI stations.
d) FAI CQ calling is proposed to be done thus:
. . . CQF CQF CQF de HB9QQ, HB9QQ . . . The reason for this method is that it will make it clear that it is a FAI test CQ. This procedure is also used with Aurora tests, CQA has been used very successfully.
e) FAI reports to contain the following information:
. . . de HB9QQ RPRT 54F QTF 080 EL 12 . . .
A report indicated with the letter F ensures that the other station realises the FAI mode of propagation. The other information is very important for final correlation of good FAI zones.

REPORTING FAI CONTACTS

All reports and results of experiences with FAI should be sent to a central point. How this is to be regulated is presently very vague. It is proposed that, initially, national organisations collect the data until such time as a permanent IARU Region 1 co-ordinator is appointed.

CONCLUSION

This article has been presented in the interest of serious experimenters and researchers. It does not profess to be complete and/or totally correct. Anyone genuinely interested in FAI is asked to contact Pierre Pasteur HB9QQ, Sunnhaldenstr 28 A, CH-8600 Duebendorf, who, while writing this article, acknowledges with appreciation assistance from John GM4IHJ.

—Reprinted from *VERON* June 1986 and translated by John Aarsse VK4QA

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QSP

NEW RADIO BAND

Commercial and private users of radio in Australia are now being offered a relatively new VHF band. The Department of Communications released the 40 MHz band last year and it is permitting repeater stations.

Companies selling transceivers for this band claim that its ground wave propagation make it superior to the higher VHF bands in rugged and hilly terrain.

COMPUTER EDUCATION

Over the next four years the Victorian Government anticipates spending $20 million developing computer education in state schools.

The allocation will ensure that computer technology is made available to all primary and post-primary students in Victoria.

Computer education is now a major education priority as familiarity with computer technology will greatly enhance young people's future.

Power Supply for a VIC-20 Computer

Keith Rehe VK4AIO
7 Guardsman Avenue, Alexander Hills, Qld. 4161

An alternative power supply for the Vic-20 is constructed thus . . .

Being a user of a Vic-20 computer, like many others I expect, I am having power supply trouble. My supply has always got hot but this time it stopped completely (gave up the ghost).

This particular unit requires nine volts AC and five volts DC.

An alternative supply was constructed in the following manner.

Using an old electric blanket transformer, I removed several turns from the secondary winding to give exactly nine volts AC.

The regulator board was removed from the original Vic-20 supply and installed inside the transformer control unit.

The offending component (the regulator) is encapsulated in epoxy resin and can be unsoldered and left behind. Replace the regulator with a 7805 and use a ***very good heat sink.***

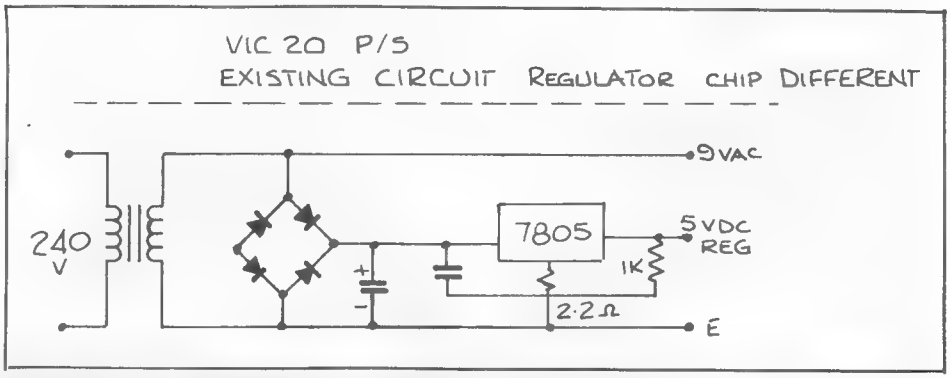
Connect nine volts AC to the board and use the existing power supply to computer lead (removed with the board from the old Vic-20 supply). Bridge the 2.2 ohm resistor and remove the 1k resistor.

The constructed unit, not being enclosed in epoxy does not get so hot and should last longer.

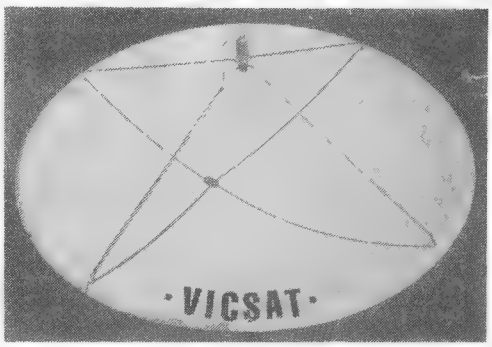
At least it will be easier to service in future!

No originality can be claimed for the circuit . . . just the idea!

Figure 1 — The Vic-20 Existing Power Supply Circuit (regulator chip different).
Bridge is a 2.2 ohm resistor
Remove the 1k resistor
Use a good Heat Sink



SATELLITE RECEIVE ONLY DISHES



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IT TOOK OSCAR TO INTRODUCE US to the world!

Technology in communications has advanced so rapidly that we now rarely give a second thought to live telecasts from overseas. The same technology has revolutionised radio communications and Joe Ellis VK4AGL, of the Sunshine Coast Amateur Radio Club, says amateurs have spoken on their sets to people up to 39 000 kilometres away. Joe, in the following article which was published in *NEWS PLUS*, traces advances in radio communication over the past 30 years.

At 10 pm in October 1957, near the village of Tyuratum, 240 kilometres north-east of the Sea of Aral, a Russian rocket blasted off into space carrying *Sputnik One.*

Shortly after midnight a BBC radio operator at a monitoring station near London noted an unfamiliar beep-beep-beep signal.

Direction-finding equipment showed the direction changing rapidly. Only one conclusion was possible, that the signal was coming from an artificial space satellite. The space age had begun.

In the mid-1940s, long before this event, it was well-known that satellite relay stations could enable earth stations to communicate over large distances.

Other space techniques were already being prudently investigated at this time. *Project Echo* involved placing large 30 to 40 metre aluminised balloons into orbit. *Project West Ford* was an attempt to create an artificial reflecting band around the earth by injecting hundreds of millions of copper needles into space.

It is a matter of history that the United States abandoned these efforts and followed the Russian's Sputnik a few months later with *Explorer One.*

The radio signals from *Sputnik* were so loud that thousands of amateur radio operators and shortwave listeners were able to hear the spacecraft. The world responded with surprise and elation, according to newspaper reports of the day, to these wondrous events.

What was your reaction? I remember feeling a little uneasy by it all. Certainly I did not imagine that I would be talking to other parts of the planet via satellite from my own home in future years!

The story of amateur radio satellite operations began in 1959 when a group in the United States constructed a device and managed to get a free lift on a rocket which blasted off from Vandenberg Air Force Base late in 1961.

Orbiting satellites carrying amateur radio gave rise to the short term OSCAR. This was OSCAR One and it sent signals for 22 days before decaying and burning up in the earth's atmosphere.

OSCAR Five is of particular interest to Australians as it was designed and constructed by students at Melbourne University. The project was finalised in 1966. It had to wait four years before a free launch was negotiated on a NASA rocket in 1970. The first successful command of an amateur satellite took place on Orbit 61 of this Australian designed unit.

Another amateur device of interest is OSCAR Nine. Designed and built at the University of Surrey, UK, it was launched during 1981 into a low flying Polar orbit 544 kilometres above the earth. It is a scientific unit sending radio propagation details and other information.

Russian radio amateurs have also launched their own versions. Sputniks Three to Eight were all launched together into low altitude orbits and are solar powered.

The Japanese amateurs, who have assisted with the construction of previous OSCARS recently launched their own satellite, JAS-1.

There was excitement among the international radio operator community in 1983 when OSCAR 10 was launched via a European Space Agency rocket. A previous attempt to deploy an OSCAR 10 ended in disaster when the Ariane rocket blew-up after launch, dumping hundreds of volunteer hours of work into the Atlantic Ocean.

OSCAR 10 is operating in a high altitude Moiniya orbit. This enables us to communicate through this device for long periods without significant changes in the azimuth and elevation in our antenna system.

Designed for a life expectancy of seven to 10 years, it recently became affected by solar/cosmic radiation. For the technically minded, the satellite is of tristar construction and weighed 90 kilograms at launch.

President John F Kennedy said in a report to Congress in 1961: "I invite all nations to participate in a communications satellite system in the interest of world peace and closer brotherhood among the people of the world."

Some of the 16 000 amateur radio operators in Australia have taken up this challenge and are able to bypass censorship and Governments and directly communicate with other human beings on this planet, thus contributing to a more peaceful world.

—Reprinted from *News Plus* and contributed by John Aarsse VK4QA

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CABLE		N CONNECTORS	
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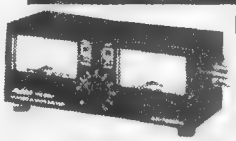
HF-VHF SWR-POWER METER

HS-260



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D-130

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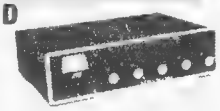

Apart from being extremely versatile the MFJ-941B includes a 6-position coax-switch, SWR power meter, 4:1 Balun and will feed balanced line, single wire and coaxfeed antennas.

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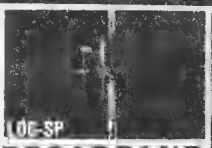

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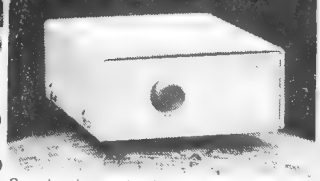

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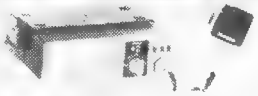

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Debeglass	[illegible]	[illegible]	43	30	[illegible]	[illegible]
Steel [illegible]	25	[illegible]	370	[illegible]	[illegible]	[illegible]

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1986 REMEMBRANCE DAY OPENING ADDRESS

Tape transcribed by:
Ron Fisher VK3OM

Profile researched by:
Ken McLachlan VK3AH

Every year the Remembrance Day Contest is preceded by a short opening address on all frequencies by a notable personality.

This year, it was thought fitting that, due to the 150th Anniversary Celebrations in South Australia, a well-known South Australian should present this address. No better choice could have been made than the notable Australian, Sir Mark Oliphant.

Before presenting Sir Mark's address, a little about this great man.

SIR MARK OLIPHANT

Marcus Laurence Elwin Oliphant, was born in Adelaide on October 8, 1901 and was educated at the Unley and Adelaide High Schools and later at the University of Adelaide, gaining an Exhibition of Distinction to enter Cambridge University. Here he obtained his PhD.

He gained employment at the famous Cavendish Laboratory under the eminent New Zealand atomic physicist, Lord Rutherford.

At the age of 34, he became the laboratory's assistant director of research and in 1937, accepted the position of Poynting professor of physics and head of the physics department at the University of Birmingham. In 1943, his secondment by the United States of America was approved, where he was to work with American scientists that developed the atomic bomb.

This gentleman was one of the team of scientists who discovered the 'deuterium reaction' that led to the development of the hydrogen bomb. During World War II he concentrated his abilities on the research of radar and atomic energy.

He has consistently opposed the use of nuclear weapons and one of his many philosophies which he quotes many times is "scientific discovery must be studied in relation to its use and misuse by mankind."

Sir Mark holds many degrees conferred by various universities. He has had notable employment both in Australia and overseas, some of the positions being Director of School of Research in Physical Sciences (1950-1963) and Professor of Physics of Ionised Gases at the Institute of Advanced Studies at the Australian National University (1964-1967).

Marcus Oliphant was knighted in 1959, at the age of 58, for his contributions to science.

In 1971, he was appointed Governor of South Australia, a position he held for five years. His popularity in that state was overwhelming due to his being a public spirited and free-speaking citizen.

Sir Mark Oliphant, AC, KBE, FRS, thank you for your participation in the 1986 Remembrance Day Contest.

THE 1986 REMEMBRANCE DAY OPENING ADDRESS

I am honoured to be asked to speak during this Remembrance Day Contest though I think that I belong to a generation which knew nothing of the techniques or achievements of radio as exists today.

When I was a youth, radio amateurs used spark transmitters, Morse code and crystal detectors. Such enthusiasts did not realise that they were pioneers of the solid-state electronics used by both professionals and amateurs now. I shall mention this again later.

In the laboratories of the Department of Physics of the University of Adelaide, we used crystal receivers to listen in earphones to the local radio station which transmitted time signals and Morse code messages to ships in the neighbourhood. Then just after the First World War, the first De Forest Audion valves were received. These little tubes contained gas, which glowed when in use, and the tungsten wire cathodes did not last long. Nevertheless, it was with one of these that I first heard music in earphones, which had been transmitted by an American ship then in port.

Professor Kerr Grant was away on study leave so he missed this thrilling experience. Shortly afterwards the hard vacuum three electrode valves appeared.

George Fuller, my fellow honours student, invested in a complicated six valve receiver with successive, separately tuned radio frequency amplification components, which had to be tuned by turning six separate knobs.

I wondered then, and I still wonder, how anybody ever had the patience to use such a device. In those days, there was no mention whatever of radio in the lecture given in the Department of Physics.

Although the electro-magnetic theory, that is Maxwells equation formed the backbone of part of the course.

When I left Cambridge in 1937 to become the Professor of Physics in Birmingham, the whole of the university, including the laboratories of the Physics Department, operated on direct current, which was generated in the Department of Mechanical Engineering, with reciprocating steam plant, so in the laboratories there were no experiments using alternating current and consequently, no electronics of any kind.

An honours graduate in physics at the end of his course knew nothing of electronics. We, who were senior members of the Cavendish Laboratories, where Appleton, Radcliffe and others had done historic work on the Heaviside layer of the upper atmosphere and used electronics extensively in their investigations, had been inducted into the secrets of radar before the war.

When war broke out, we were immediately assigned to war-work in that field. This was not a simple task in my physics department, where no electronics had been taught. The shortest wave length available using the vacuum valve known as the *Micro-pup* was about 50 cm. This was not suitable for air-borne radar. So I was assigned the problem of how to generate pulses of radio power with a wave length of 10 cm or less. Having visited the various manufacturers of radio valves, I decided that we needed a team of people able to think in terms of first principles, rather than the practice of radio as it was at that time.

It seemed clear to me that it was essential that the resonant circuit of the oscillator for these very short wave lengths must be an integral internal part of the system rather than external to an electronic valve the size which could never be reduced greatly and still give appreciable power.

So we began with a continuously evacuated klystron which produced about 600 watts of radio frequency power and gave good echoes from aircraft and ships.

Doctor Sayers was the keyman in that demonstration. The receiver was a silicon crystal which was used in a super heterodyne circuit, converting the radio frequency to that used for early British television, the circuitry for which was available commercially.

It was the diode to which Bell Telephone Laboratories added a third electrode and the transistor was born.

Meanwhile, Randell and Boot produced the concept of a ring of oscillatory circuits surrounding a cathode at the centre of a magnetic field, the so-called cavity magnetron. He and his colleague Boot developed this to give many kilowatts of radio frequency power in pulses at a wave length of 10 cm.

After some modification by Sayers, this became the standard technique in late wartime radar. It is ironic perhaps, that the greater use of the magnetron today is in the microwave oven.

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Photograph courtesy *The Advertiser, SA*

Sir Mark Oliphant being sketched by Kerrie Elliott.

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THE COLLINS S LINE

The name Collins is synonymous with high quality communications equipment. It is also one of the oldest names in amateur radio's history of commercial equipment manufacturers. In pre-war days, Collins produced a series of amateur transmitters with power levels ranging from about 50 watts to a full one kilowatt input. At this time, Collins did not produce any amateur receiving sets and it was not until 1947 that they released their first receiver, the 75A.

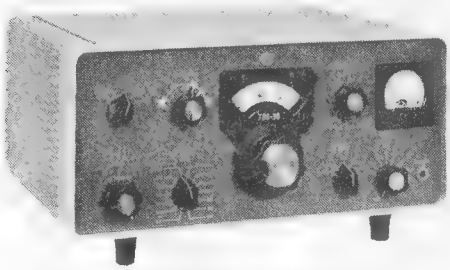
Its design was, for the time, radical to say the least, with crystal locked front end converters feeding a tunable IF. It was this design that was to set new standards in stability and accurate frequency calibration.

Soon after this, Collins released their mechanical filter, which was able to produce a flat top, steep sided selectivity curve which was almost impossible to achieve with normal tuned circuits. These filters made the generation and reception of single sideband much simpler and effective. The last of the 75 series, the 75A4 is still looked upon as a classic in the design of amateur SSB receivers, and it was released in 1955. Soon after this, Collins produced their first SSB transmitter, the KWS-1.

However, very few of these were ever imported into Australia due to rather stringent import restrictions that applied at that time and also, no doubt, to the very high price. In those days, the average Australian amateur thought himself very lucky if he owned a war disposals receiver such as an AR88 and either a modified surplus transmitter, or a home built unit, perhaps incorporating the latest Geloso VFO unit.

Collins produced the first amateur SSB transceiver in 1957, the KWM-1. This covered the 20, 15 and 10 metre bands with a pair of 6146 tubes in the final.

It was in 1959 that the Collins S-Line was released with the 75S receiver and 32S transmitter which were imported into Australia in small quantities.



THE COLLINS 75S RECEIVER

The 75S receiver was produced in two versions, the '1' and the '2'. These were double conversion designs with a tunable first IF at 3.155 to 2.955 MHz and the second IF at 455 kHz with a 2.1 kHz filter for SSB reception. All Collins receivers from the original 75A on used a permeability tuned VFO to give linear calibration and high stability. The amateur bands from 80 to 10 metres were covered in switchable 200 kHz segments with only one segment, 28.5 to 28.7 MHz supplied as standard on 10 metres.

The all tube line up was 6DC6 RF stage, ½6U8 first mixer, ½6U8 second mixer, ½6U8 crystal oscillator, 6DC6 first IF, 6BA6 second IF, 6U8 product detector and BFO. 6AT6 AM detector, AGC detector and first audio, 6BF5 audio output, 6AU6 VFO and ½6U8 isolation amp. Two of the new silicon diodes were used as power supply rectifiers.

The main tuning dial was calibrated in one kilohertz divisions widely enough spaced to allow frequency to be read accurately down to about .25 kHz.

The 75S-2 was designed for extra frequency coverage with an additional 14 band positions. With the appropriate crystals installed it was possible to tune any frequency between 3.4 and 30 MHz. These receivers were built to the highest commercial standards and, in fact, probably more were used in commercial point-to-point services than were ever sold to amateurs.

The original price of the 75S-1/2 receiver is not known (perhaps someone can fill me in). Second-hand value is very dependent on condition. Older Collins receivers and transmitters are like Leica cameras — collectors items.

The 75S-1 in excellent condition is about $200 and the 75S-2 about $225.

THE COLLINS 32S TRANSMITTER

This is a matching transmitter for the 75S receiver described above. Almost identical in appearance to the receiver, the 32S used the same type of VFO and mechanical filter as the receiver. The final stage used a pair of 6146 tubes to give around 100 watts output. Collins were among the first to employ negative RF feedback across the final stages to reduce inter-modulation distortion. Japanese manufacturers did not discover this until Kenwood introduced it in the TS-820 some 18 years later! With the same VFO and IF set up, the transmitter and receiver could be coupled together to transceive. This worked very well compared to some of the early Japanese efforts which did not quite come-off. The 32S required a separate power supply with 800, 275 volt HT plus 6.3 volts AC and -60/80 volts bias.

The Collins 516F-2 power supply met these requirements, but most of these operated from 115 volts AC only. Tube line up of the 32S transmitter consisted of 6U8s, 6DC6s, 12AT7s and a 6CL6 driving the two 6146s. The 32S-1 is the amateur band version while the 32S-2 has an additional 14 crystal positions for use on other required frequencies. Second-hand value today would be about $225 for the S-1 and $250 for the S-2.

The addition of a matching power supply would add about $75 to these prices but many of the transmitters in use here have home-made power supplies which might not be worth very much. Often this equipment is sold as a matched pair and this is certainly the best way to buy, although it is often cheaper to try and buy each unit separately.

THE COLLINS 75S-3/B/C

These are up-graded versions of the S-1/2 receivers, released about 1962. Additions to the earlier series included a most effective notch filter, a variable BFO for CW reception, an optional filter for CW and RTTY and selectable AGC decay time. Appearance is the same as the 75S-1/2 with the addition of a couple of control knobs. The B-model is the amateur band- only while the C has the additional crystal board. Price of these receivers when new (1972) was $1223 for the B and $1310 for the C. Second-hand value today would be about $300 for the B an $325 for the C.

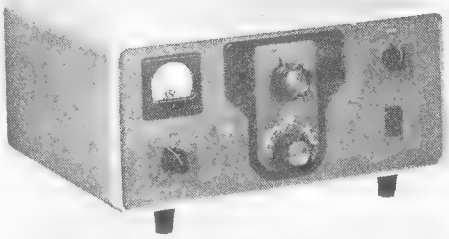
Collins enthusiastically identify early or late models of this series by the Collins badge above the dial which was changed from a winged to a round type badge about half-way through the production run. A round badge model will usually command a higher price.

THE COLLINS 32S-3 TRANSMITTER

The matching transmitter for the above receiver, is similar to the S-1 but again, upgraded in the following ways.

A CW spotting control to facilitate CW netting, and provision for RTTY operation. Many of the remarks on the 75S-3 receiver also apply to the transmitter.

The 32S-3A has the extra crystal board for extended frequency coverage. Second-hand value today would be about 325.



THE COLLINS 30L-1 LINEAR AMPLIFIER

This is the companion linear for the above receiver and transmitter combination. Also usable with the Collins KWM-2 transceiver to be covered in a later article.

Fully self-contained with power supply, the 30L-1 uses four 811A tubes in parallel. Rated at 1000 watts PEP input with 70 to 100 watts of drive, but actually capable of somewhat higher power. Power output 700 to 800 watts. This amplifier features the usual Collins superior design with negative RF feedback and automatic load control.

A very desirable linear for any amateur application. Price when new (1972) was $731 but today would be worth around $1000 if you can find one.

NEW ABC RADIO NETWORKS

FM transmitters at 42 sites in Queensland and Western Australia will begin broadcasting programs on the ABC's new Second Regional Radio Network in the first half of 1987.

The first phase of the new network, costing over $1.6 million, will benefit 40 000 people in Queensland and 17 000 in Western Australia.

Another 300 sites around Australia are to be included in the network over the next 10 years.

FIBRE OPTIC NETWORK

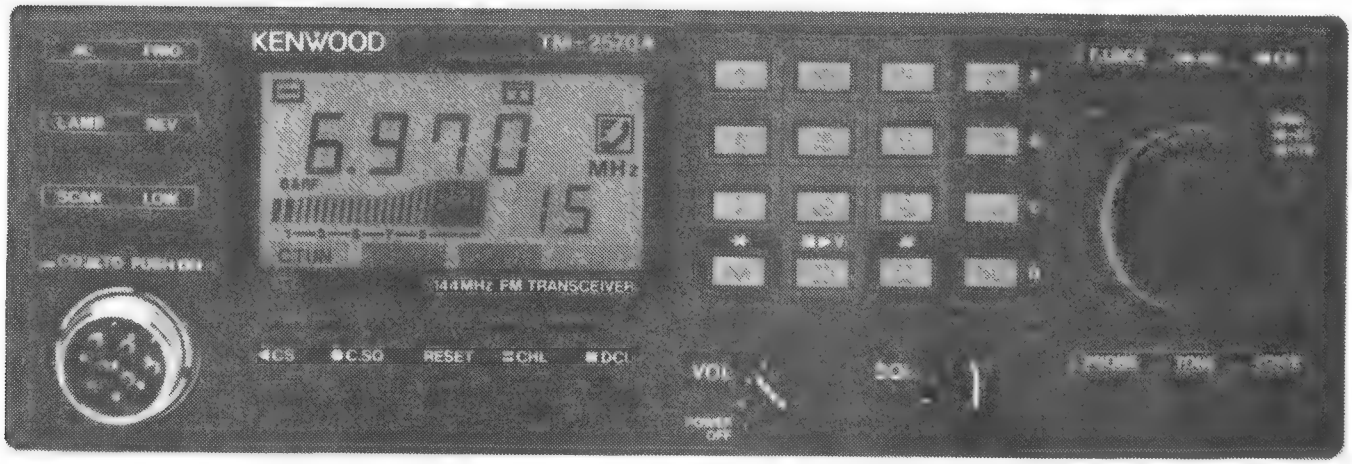
Telecom Australia plans to lay a 2 700 km optical fibre link between Perth and Adelaide by 1989. This is part of a national optical fibre program to connect all Australian mainland capital cities by 1992.

The Perth-Adelaide link will be the world's longest link without intermediate terminals.

Later links will be Adelaide-Darwin and Adelaide-Brisbane, with a spur line connection to Melbourne and Sydney.

A fibre optic loop for the Melbourne central business district is nearing completion and a similar loop is being considered for Sydney.

The optical fibre links consist of hair-thick strands of extremely pure glass and are capable of carrying all types of telecommunications traffic.



Equipment Review

Ron Fisher VK3OM
3 Fairview Avenue, Glen Waverley, Vic. 3150

THE KENWOOD TM-2550A/2570A TWO-METRE FM TRANSCEIVERS

These transceivers have been released as updated replacements of the TR-7950 series, two metre FM transceivers. The TR-7950 was reviewed in the July 1983 issue of *Amateur Radio.* The new transceivers retain all of the desirable features of the old models while introducing several updates that again put Kenwood into the lead with two metres FM. Perhaps the outstanding achievement is putting 70 watts output (the 2570A) into a mobile size package.

The TM-2550A is rated at 45 watts output which is the same as the original TR-7950. This review will concentrate on the higher powered model.

TM-2550A/2570A DESCRIPTION

These two metre FM transceivers have identical features except for the difference in power output. Because of this, the higher powered version is slightly larger because of the increased size of the final amplifier heat sink. Overall dimensions are 180 x 60 x 215 mm (WHD), for the 2550A, and 250 mm (D) for the 2570A. Weight is 2 and 2.35 kilograms respectively. In addition to the larger heat sink, the 70 watt model also has an in-built cooling fan which is thermostatically controlled.

Full coverage of the two metre band is provided in five kilohertz steps. Required frequencies are selected by entering them on the keyboard, then transferred to one of the memories. Memories are selected by the large right "tuning" knob. Any one of the memories can be designated a priority channel with the receiver sampling this every five seconds and sounding a loud double beep if the channel is active. Also, any of the memories can be selected to be skipped during the memory scan.

The LCD display has been greatly expanded on the new transceivers. The old TR-7950 used an LED S-meter and LEDs to indicate reverse repeater operation, the centre tuning indicator and the priority channel selection. These are now all incorporated into the LCD display.

The S-meter is particularly good with 24 calibration points as against only seven on the old 7950. Just how the S-meter actually works out in practice will be covered later in the test section. However, the greatest update in the new models is the list of options. As our review transceivers were not actually fitted with any of these, I can only describe them and then leave the choice to you.

First is an option that will be taken up by amateurs with impaired sight, the VS-1 voice synthesiser. At the touch of a button, this will announce the frequency, memory channel selected as well as information on the optional call systems possibly fitted.

Next, the MU-1 "Digital Channel Link System". This wondrous sounding gadget performs all sort of magic tricks, however, it is necessary to have two (or more) similarly equipped transceivers to make things work. Firstly, if it becomes necessary to change frequency, the DCL searches for a clear channel, then returns to the original channel and informs the other transceiver and they then both change to the new frequency, completely automatically. If the CD-10 call sign display unit is connected to the transceiver, stations who have called you will have their call signs displayed on the screen. I hope in the future to obtain a pair of the complete DCL plus call display units and actually try them out. If any readers have had experience with them, please let me know.

ON THE AIR

With a transmit current drain of 16 amps, a solid power supply is required. Kenwood recommend their PS-50, which is rated at 20 amps output. I used my Icom PS-15 and also Yaesu FP-707 power supplies and both supplied the required current with no trouble. The 2550A requires just under 10 amps on transmit, so a 10 amp supply should suffice so long as you keep your transmissions to reasonable length.

Selecting frequencies, repeater offset and then entering them into the memory is very easy. As each number or function is selected, a beep is heard to indicate that the command has been accepted.

Comprehensive scanning facilities are provided. The memory scan can be programmed to stop on a busy channel for either a preset time of up to about 10 seconds or at the conclusion of the transmission. Selected channels can be skipped during the scan by means of the "lock-out" facility.

Two types of band scan are available. First, a full band scan and second a programmed scan. The upper and lower points of this are entered into memory 'd' and memory 'u'. Scanning direction can be reversed simply by pressing either the up or down buttons on the microphone. Scanning speed can be increased by holding these buttons down. Another of the nice features is the centre stop facility. This means that scanning will only stop when the signal is properly tuned onto the frequency.

One of the nice features on these new units is the rear illumination of the front panel. For night time mobile operation this certainly sets a new standard. All keyboard buttons and other control labels feature this in a translucent green — very nice!

Received audio quality from the larger-than-average internal speaker is quite good. The speaker is mounted in the top of the cabinet, good for mobile operation so long as it is not firing up into the underside of the dashboard. With a good quality external speaker, the received audio is exceptionally good.

Transmit audio was checked with two microphones, the supplied MC-42S hand- held with up/down scanning buttons and the MC-60A desk type. The hand-held produced crisp clear audio while the extended response of the MC-60 was reported as "broadcast quality." I am pleased to see that Kenwood have fitted a now-standard eight pin microphone connector which is compatible with other current models. The locally supplied earlier model, the TR-7950, had, for some reason, a six pin connector which caused many compatibility problems. Strangely though, the Trio model of the same transceiver had an eight pin connector.

Transmit tests were carried out over extended periods to check retention of output power. Many transceivers tested show a falling-off of power after a short time. Both of these transceivers delivered consistent power over several hours of testing.

Operation was also checked at supply voltages below 13.8 volts. Power output fell slowly down to about 10 volts and at this point, the 45 watt model was down to 20 watts, and the 70 watt unit was down to 35 watts. Below this voltage things died rather rapidly.

ON TEST

The following test equipment was used to produce the figures obtained during these tests.

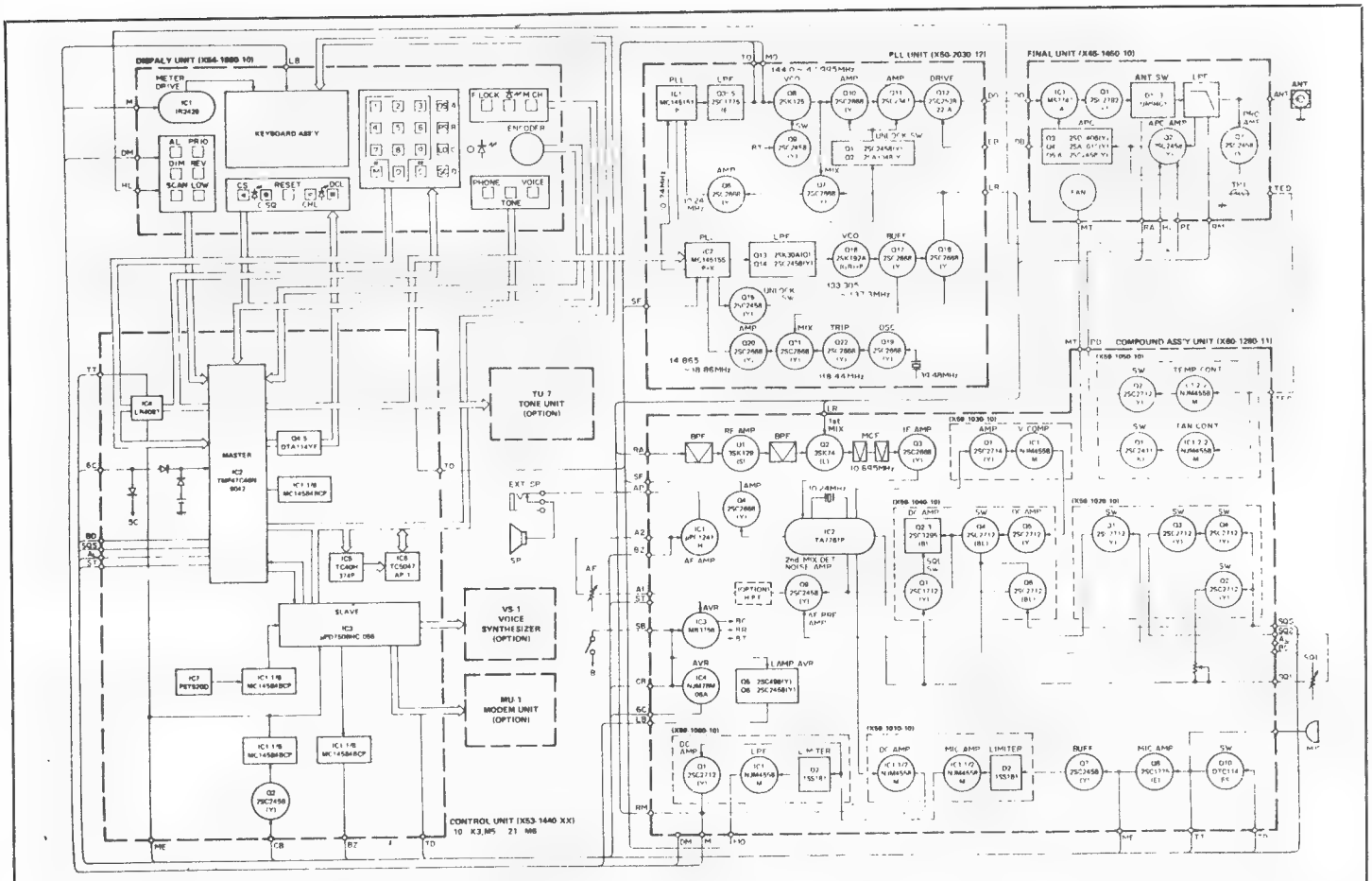
Yaesu YP-150 terminating RF power meter, Marconi TF-957/1 terminating RF power meter, Marconi TF-995A/5 signal generator, Daven audio power output meter, AWA F242A noise and distortion meter. All tests were carried out with a regulated 13.8 volts applied to the transceivers unless otherwise stated.

Transmit Power Output

The two transceivers were checked with the following results.

TM-2550A

POWER O/P HIGH	POWER O/P LOW
47 watts	4.5 watts
9.7 amps	3.2 amps



Block Diagram of the TM-2570A.

TM-2570A

65 watts	4.7 watts
15.8 amps	3.3 amps

It is noted that the low power output setting is adjustable over a fairly wide range. The above figures were taken with the factory set power and no attempt was made to alter this.

Receiver Tests

The S-meter was checked first. The new LCD bargraph has two indicators per S-point, with calibration points at 1, 3, 5, 7, and 9. There are then six indicators to show S9+.

S1	S3	S5	S7	S9	//	////	//////
1.25	1.6	2.0	2.5	3.1	4.0	5.0	6.3 uV

This works out to 2 dB per S-point or about 1 dB per /.

This again shows that S-meters are very different on VHF transceivers compared to HF equipment. As many signals are obviously stronger than 6.3 uV, this strength indicator is only useful for relatively weak input levels.

Receiver sensitivity was checked at 146 MHz with the following results.

RF INPUT	SINAD	S/N RATIO
.1 uV	20 dB	15 dB
.2 uV	22 dB	18 dB
.5 uV	27 dB	24 dB
.1 uV	35 dB	30 dB

Full quieting was reached at about 2 uV with a noise output of -44 dBm.

Receiver audio output was checked by feeding the extension speaker output to an eight ohm terminating power meter with the noise and distortion meter bridging this.

Max Power Output	3.25 watts	28 percent distortion
	2.00 watts	1.5 percent distortion
	.50 watts	.8 percent distortion

These figures are rather better than the specified 1.5 watts at five percent distortion, but I still think that a mobile transceiver of this type should have at least five watts output at below five percent distortion.

Received current drain was checked. The 2550A was .6 amps squelched to .8 amps with one watt of tone output. Relative figures for the 2570A .8 amps and 1 amp.

Frequency stability and accuracy for both transmitter and receiver were checked and found to be better than 100 Hz under all conditions.

INSTRUCTION MANUAL

As I mentioned in my recent review of the TS-440S, Kenwood instruction manuals have improved somewhat of late. I hope they do not stop at this point because there is still a long way to go.

The addition of some good definition photographs of the internal layout would be useful, as would a printed circuit layout. I know that much of the information is included in the optional workshop manual, but as the cost of these is now about $30, this may be beyond many tight-budgets.

However, the following information is included: Controls and their functions; Installation; Operation; Maintenance and adjustment; Operational accessories; Block diagram and specifications.

Operational instructions are very well written and cover a commendable 17 pages. With all of the optional calling systems, much of this information might not be required for normal operation, but it is handy to have it just the same.

The maintenance and adjustment section does not go into anything of a highly technical nature. It contains hints on battery connection, microprocessor reset and lithium battery replacement, a factory agent job, and then adjustments on such things as the low power RF output set and microphone gain control.

CONCLUSIONS

These are both excellent transceivers and are certainly worth consideration if you require a high powered, two metre FM rig. Their somewhat large size perhaps makes them more suitable for a base station operation rather than for mobile use. Kenwood produce a range of compact FM transceivers that will fit into the limited space available in modern cars. If you are trying to decide between the 45 and 70 watt version, I would recommend the higher power version because of its superior final stage cooling. With the larger heat sink and built in cooling fan, it actually runs cooler than the lower powered version.

Thanks to John Hill of Emtronics, Melbourne Division for the loan of the TM-2570A and to Kenwood Electronics Australia Pty Ltd, via Eastern Communications for the loan of the TM-2550A.

EVALUATION AND ON-AIR TEST AT A GLANCE of the Kenwood TM- 2570A . . . Serial No 7031506

APPEARANCE

Packaging
**Single carton full of foam box insert.

Weight and Size
**Not the smallest or lightest. For mobile use you might prefer one of the smaller units.

External Finish
***Very well finished. Although the all black-colour scheme is a bit sombre.

Construction Quality
***Well put together with good quality components.

FRONT PANEL

Location of Controls
***There are 19 knobs or push buttons, plus a 16 button keyboard. Quite a feat to fit them all in.

Size of Controls
**Due to the above, buttons are small and hard to operate, especially under mobile conditions.

Labelling
***With the fully illuminated front panel, all labelling is very clear and concise.

Status Indicators
***On air, centre tune, repeater offset, etc.
LCD READOUT
***Lots of information presented. Illumination could be brighter.

RECEIVER OPERATION
Memories
****There are 23 memories with frequency, repeater offset, and even telephone numbers (not much use in Australia).
S-meter
***The bar-graph representation is good. Like most VHF equipment, the range is limited.
Spurious Responses
****Excellent. Strong signal handling and rejection of out of band signals is top class.
Sensitivity
****Excellent. See Test Section.
Received Audio
***Internal speaker is good and top mounted. With external speaker — very smooth quality.

TRANSMIT OPERATION
Power Output
***For size of unit, very good. The 70 watt version is the highest powered mobile unit available.
Transmit Audio
***With supplied hand-microphone — good. With optional MC-60 microphone — excellent.
Cooling (2570A)
****With built-in fan and adequate heat sink — excellent.
Cooling (2550A)
***Actually runs warmer than the higher powered model.
Metering
**Power output indicator only.

Manual
Owners Book
**Better than many. Operation covered very well but more information needed.

OVERALL RATING
****It seems we are never totally happy with any thing, but overall performance is excellent so long as you have the space to fit it in.

RATING CODE
* Poor, ** Satisfactory, *** Very Good, **** Excellent

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SHARE YOUR STORY IN AR . . .

JOTA 1986

Greetings once again to all and especially to anybody who has decided to, or been asked to, operate a JOTA station this month.

The 29th Jamboree-on-the-Air will be held over the weekend of October 18- 19, 1986, beginning at 0001 hours ***Local Time*** on the Saturday. JOTA will conclude at 2359 ***Local Time*** on Sunday. Stations may operate for all, or any part of this period.

Either you have every thing under control or, as in most cases, you hope that all will be okay on the day. We know any effort to assist will be much appreciated. Remember these annual events that happened previously for us are still new to the next generation.

If you can go portable at a JOTA location, even though you may not stay long, it is the kind of public relations exercise that is good for both participants.

This year, the Scout and Guide Movement has decided to be the party to initiate a station. It is hoped they will have success and not receive too many "knock-backs" from potential operators.

One highlight of the day will be the Chief Scout/ Governor-General's broadcast from Canberra. (Dural station will avoid last years failure by a VHF relay link if required owing to poor propagation). Reliable VHF communication is good over the mountains and into VK1.

Do not forget, the JOTA station fills in the log and report sheets, supplied by your Scout/Guide Leader. You do not have to fill them in but they are necessary for final assessing of the success of JOTA activities.

During discussion regarding the day, ask how many guests you can expect and if a leader will always be present. If possible always require a pole-tower or tree to be needed for one end of your dipole. This is a favourite pastime for the troops and generally ends-up with their flag atop.

The day does involve some work, but it is a good excuse to do something different.

—Contributed by John Bunn VK2NDJ, VK2 JOTA Co-ordinator, PO Box 1066, Parramatta, NSW. 2150

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SPECIFICATIONS FOR CONSTRUCTING PIPE FOR A FOREIGN GOVERNMENT

All pipe is to be made of a long hole, surrounded by plastic or metal centred around the hole. All pipe is to hollow throughout the entire length. Do not use holes of different length than the pipe.

The inside diameter must not exceed the outside diameter, otherwise the hole will be on the outside.

All pipes over 500 feet in length should have the words "Long Pipe" printed clearly on each end, so the contractor will know that it is a long pipe. Pipes over two miles in length must also have the words "Long Pipe" painted in the middle, so the contractor will not have to walk the entire length of the pipe to determine whether or not if it is a long pipe or a short pipe.

All pipes over six inches in diameter must have the words "Large Pipe" painted on it, so the contractor will not mistake it for a small pipe.

Flanges must be used on all pipes. Flanges must have holes for bolts quite separate from the big hole in the middle.

When ordering 90, 45 or 30 degree elbows, be sure to specify right hand or left hand, otherwise you will end up going the wrong way.

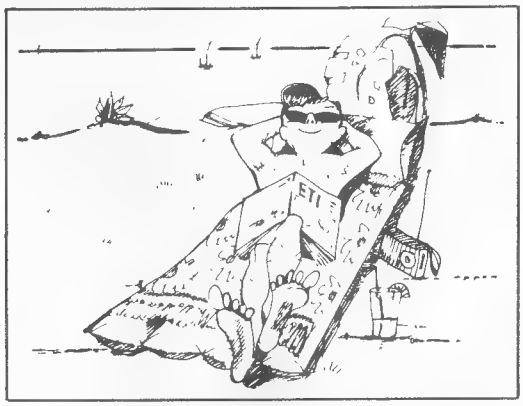
Be sure to specify to your vendor whether you want level, uphill or downhill pipe. If you use downhill pipe for going uphill, the water will flow the wrong way.

All couplings should have either right hand or left hand threads, but do not mix the threads, otherwise as the coupling is being screwed at one pipe, it is being unscrewed at the other.

Contributed by Bill VK3CFL, via Bruce Bathols VK3UV

SHARE YOUR STORY IN AR . . .

IN eti THIS OCTOBER,



- The lure of tropical bands
- Radio in Macau
- A career in electronics
- HOTOL: a boost for ESA
- MIDI, the computer music link

- Plus news, reviews, projects and more!

eti Electronics Today International

VHF UHF — an expanding world

Eric Jamieson VK5LP
1 Quinns Road, Forreston, SA. 5233

All times are Universal Co-ordinated Time and indicated as UTC

AMATEUR BANDS BEACONS

FREQUENCY	CALL SIGN	LOCATION
50.010	JA2IGY	*Mie*
50.060	KH6EQI	*Honolulu*
50.075	VS6SIX	*Hong Kong*
50.109	JD1YAA	*Japan*
52.013	P29BPL	*Loloata Island*
52.020	FK8AB	*Noumea*
52.100	ZK2SIX	*Niue*
52.150	VK0SJ	*Macquarie Island (Keyer)*
52.200	VK8VF	*Darwin*
52.250	ZL2VHM	*Manawatu*
52.310	ZL3MHF	*Hornby*
52.320	VK6RTT	*Karratha*
52.325	VK2RHV	*Newcastle*
52.350	VK6RTU	*Kalgoorlie*
52.370	VK7RST	*Hobart*
52.420	VK2RSY	*Sydney*
52.425	VK2RGB	*Gunnedah*
52.440	VK4RTL	*Townsville*
52.450	VK5VF	*Mount Lofty*
52.460	VK6RPH	*Perth*
52.465	VK6RTW	*Albany*
52.470	VK7RNT	*Launceston*
52.485	VK8RAS	*Alice Springs*
144.019	VK6RBS	*Busselton*
144.400	VK4RBB	*Mount Mowbullan*
144.410	VK1RCC	*Canberra*
144.420	VK2RSY	*Sydney*
144.430	VK3RTG	*Glen Waverley*
144.465	VK6RTW	*Albany*
144.480	VK8VF	*Darwin*
144.485	VK8RAS	*Alice Springs*
144.550	VK5RSE	*Mount Gambier*
144.565	VK6RPB	*Port Hedland*
144.600	VK6RTT	*Karratha*
144.800	VK5VF	*Mount Lofty*
144.950	VK2RCW	*Sydney*
145.000	VK6RPH	*Perth*
432.057	VK6RBS	*Busselton*
432.160	VK6RPR	*Nedlands*
432.410	VK6RTT	*Karratha*
432.420	VK2RSY	*Sydney*
432.440	VK4RBB	*Brisbane*
432.475	VK3AQU	*Melbourne (Keyer)*
432.535	VK3RMB	*Mount Buninyong*[1]
432.540	VK4RAR	*Rockhampton*
1296.171	VK6RBS	*Busselton*
1296.420	VK2RSY	*Sydney*
1296.480	VK6RPR	*Nedlands*
10300.000	VK6RVF	*Roleystone*

1. A letter from Dick Forrester VK3VU, advises of a frequency change for the Ballarat Amateur Radio Group Beacon to 432.535 MHz to conform with the WIA National Band Plan. It also confirms for me the existence of the beacon which has not been listed for some time and so now reappears with this issue.

DXPEDITION TO NIUE

Nev VK4ZNC, will be leaving on November 14, to mount another DXpedition, this time to the island of Niue, which has the prefix of ZK and from where I have been listing a six metre beacon for some time under the call sign of ZK2SIX.

Niue is about 4300 km from Sydney at longitude 170 degrees and latitude 18 degrees, placing it east of Tonga. Usually the best Es single hop distance is around 1600 km so it will be more than two hops to Sydney and more than three to VK5. Contact will be possible should a particularly large Es cloud develop and operators will have to be extra alert if seeking a contact. An early morning contact would seem more likely than later in the day, although there is no guarantee of this either as Es is unpredictable and that seemed the most likely mode for any contacts made. Good luck, Nev.

Nev has also indicated only about one third of the stations that contacted him have claimed their VK9LC card for the Lord Howe Island expedition. He wants to clear any backlog of cards before leaving for Niue and will make QSLs available to those who want them until the end of October 1986, after that — no cards! A return postage stamp (no envelope) is all that is requested.

VISIT TO ALICE SPRINGS

During the past month I made a trip to the Northern Territory and whilst in Alice Springs, I had the pleasure of meeting some of the members of the Alice Springs Radio Club. On the appointed night, we assembled in the luxurious lounge of the Sheraton Hotel. Those who met me were the President, Terry VK8TM, Secretary, Peter VK8ZLX, Jeff VK8GF and Tim VK8KTM.

Most of the discussion was VHF orientated naturally! Jeff VK8GF and I had known one another for some 25 years and some of our early days exploits on one metre with super-regenerative equipment caused smiles and interested comments from the other listeners. Other subjects dealt with included beacons, repeaters, QRM from other services at repeater sites, the six metre band and its likely promise of good contacts in the future.

The Alice Springs boys are well aware that their unique position geographically means they will be much sought after again this year for two metre contacts in particular and they will be going all out to provide those contacts around Australia. Improved antenna systems and increases in power will be helpful. They have not overlooked 70 cm and stations with reasonable power are likely to be operating from there as well.

With the likelihood of another extremely good Es season this coming summer and with that meaning good potential for two metre contacts, the Alice Springs boys have certainly got their act together and I hope the rewards will be contacts both ways on all three bands.

It was certainly a great evening spent with some very fine guys and one to be remembered for a long time. On leaving, they presented me with a large "Outback Australia" QSL card depicting Ayers Rock and signed by all four attending. I shall treasure that gift. Thank you.

ROSS HULL MEMORIAL CONTEST

During my discussions with the Alice Springs boys, the matter of the Ross Hull Contest was included as I was anxious to obtain the opinions of a very keen group of operators. I took with me the details of what could be possible changes to the Contest this year, in the light of experience and comments received from last year.

They added to the already known ground swell of opinion that two major factors were preventing operators from showing enough interest to submit a log. They agreed there was little doubt that there are many stations operating during the summer period and giving out numbers and who never submit a log. (VK5LP has a list of 404 call signs on six metres alone for last summer).

Whilst it was agreed every encouragement should be given to amateurs to construct or obtain equipment for the UHF bands, there are many amateurs who, for a variety of reasons, may never get beyond the 70 cm band. If the Contest was limited to the 52, 144, and 432 MHz bands (at least for the time being) it is possible that the already high level of participation could result in the log return like that of the 1960s, when development on the bands above 432 MHz had not been very great. Those able to operate 1296 MHz and above will object, which is natural, but if the Contest is to survive then something has to be done to convince more people they too have a chance of a certificate and hence enter a log.

If we were to revert to the best seven days score then even more operators are given a chance to be in the running. Not everyone can spare three solid weeks before the transceiver.

On the matter of scoring, I do not want to pre-empt what the Contest Manager may be deciding, but last year's one point per contact was judged a disaster! Short distance contacts and very long distance contacts on six metres are certainly worth more than one point. Why not two points up to 1000 km, 1000 to 2000 km one point, over 2000 km two points? On 144 MHz; up to 500 km two points, 500 to 1000 km five points, over 1000 km 10 points, 432 MHz; up to 500 km four points, 500 to 1000 km 10 points, over 1000 km 15 points. For contacts with overseas stations: 52 five points, 144 10 points, 432 15 points. This would make it worthwhile persevering with that ZL or FK contact even if it takes a while to make it. And what would be wrong with offering an extra 10 points for every completed 10 contacts in the log book, irrespective of the band; ie the running total as it appears. You might then consider it worthwhile working the operators already on the band instead of looking for the unworked prefixes (last year) for extra bonus points.

What ever scoring table is produced, it will not suit everyone, hopefully it will suit the majority. Some will say it is over simplified, but then that may be a good idea, it means less fussing around with the dividers deciding on distances. If we do no more than sort out the 1600 km distance from Adelaide to Brisbane (optimum Es path) and place it in the middle of some scale (as it is with 1000 to 2000 km) then something good will have been done. In the 1960s, the then 1000 mile (1600 km) path for a change to 10 points per contact started in the Brisbane metropolitan area, some stations were two points, other were 10, what a shambles trying to sort them out! On the above scales no change over points occur between any two capital cities. There will be isolated operators in country areas where such changeovers could occur, but most will benefit for such a spread of distances.

There is plenty of food for thought. At least contacts under 100 km have not been cut out as some would like. I believe the rules for the Contest will be in November AR, and could be fairly close to the above — at least you have something earlier!

OVERSEAS ON SIX METRES

CQ ham radio for June 1986, from Japan (courtesy VK6RO) shows we are really in the low part of the cycle. On 50 MHz the only stations being worked from Japan have been HL1, 2, 3, 4, and 5 from Korea; VS6s XMQ, XMT, XOR, XLN, and XNF from Hong Kong plus the VS6SIX beacon; and several reports of UA-RADIO on 50.610 AM. All were recorded in May 1986. Quite a few of the HL contacts have been on FM and operation has taken place above 51.000 MHz.

From the same article, it appears 9M2KY, from Malaysia, will be on 50 MHz which could be another country to look for should six metres open to the north.

BT4YRC, in China, has apparently been having two metre SSB contacts into Japan starting last May. One can envisage the dog-piles if he is a lone operator!

WINTER SPORADIC E

Most years there is a period of improved six metre conditions during June and July, and this year appears to have been no exception. Although I was away for quite a while during that period, news of contacts is filtering through. Not a lot has taken place from the VK5 end except on two metres between VK5 and VK3.

VK7ZIF was reported working VK2XJ around 0540 on 24/6; VK2BA reported working FK8EB on 13/7 around midday local time, strong signals, so probably others in VK2 worked him as well; ZL television heard in VK5 strongly for five minutes around 0500 by VK5LP; a number of meteor scatter contacts taking place between VK3 and VK2 which is interesting. Perhaps aircraft enhancement is helping some of these contacts too!

From about the time you read these notes there should be some increase in contacts via Es as we begin to approach the summer period once more. Once again I say to all to be aware of the potential for two metre contacts during periods of high Es at

SMIRK identities, Ray Clark K5ZMS, Secretary (left) and Tex Kennedy N5TX, President.

Photograph courtesy Graham Baker VK8GB

this very low part of the sun spot cycle. More stations will also be trying 70 cm this summer and again there will be a number of stations going out portable over the Christmas/New Year period, which also leads to more possible contacts. I am sure the summer of 1986/87 will be a very exciting one on VHF.

VK5LP is secretly praying for the hot weather to come soon in the hope the two metre rotator will become unfrozen. At the moment it is stuck pointing to Mount Gambier and defies efforts to move it. Being over 70 feet (21 metres) off the ground does not help to improve matters! Might have to be content with just working ZL this year!

The Newcastle Beacon, VK2RHV, on 52.325 MHz was available to VK5 for about half an hour today (18/8 2330) peaking to S3, but no stations to work. Channel 0 also there at sufficient strength to be readable. Sydney Beacon, VK2RSY, on 52.420 MHz very weak.

One could speculate at times as to the potential for contacts if amateurs were permitted to run the same power as Channel 0. It is an interesting exercise when in the shack doing other things to monitor Channel 0. Some days it is there for hours going in and out of the noise, occasionally peaking to S9, etc. Recently, I observed it very strongly around 0100 one morning for more than half-an-hour at a level good enough to produce colour. This would have had to be Es. The occasional lifting in strength observed on other occasions could be due to meteor pings. It has often been said that six metres never closes, only operators stop. That statement may be hard to actually prove, but there is evidence the band is open far more often than we give credit. That is why it is such an interesting band and worthy of more use.

FROM THE PAST

Being of an inquiring nature and interested in items from the past, I was looking through some old *QST* magazines and in May 1939 came across an article *Exploring Below One Metre* which gave details of practical equipment for operation on 325 MHz. An RCA 955 valve was used as a super-regenerative detector sitting in a specially made good quality socket. Hair pins of No 12 wire were used to form the filament lines and two turns of No 16 wire and tapped were used for the grid/plate inductor. Satisfactory contacts were being made over five miles (8 km).

In the June 1940 issue the following UHF Records existed: 56 MHz: W1EYM to W6DNS on 22/7/1938, 2500 miles; 112 MHz: W9WYX/9 to W9VTK/9 on 7/10/1939, 160 miles; 224 MHz: W1AIY to W1KLJ on 27/4/1940, six miles. However, on 28/4/1940 W6BCX worked W6OIN to extend the 112 MHz range to 200 miles!

December 1950 issue was reporting international DX on 50 MHz and distances of 1200 miles on two metres and 200 plus on 420 MHz. The USA record for 1200 MHz was 37 miles and this was bettered in England by G8DD and G3QC, who worked 75 miles. The same two had worked 46 miles on 2400 MHz, but were unable to attack the USA record of 150 miles due to lack of suitable locations.

Since those early days, distances on all bands have been lengthened many times and records continue to be set, but it does not hurt to become nostalgic sometimes!

I also have some copies of a magazine called *CQ* — a magazine issued in the interests of Australian amateur radio, dated 1928 and 1929. These were published each month by the New South Wales Division of the Wireless Institute of Australia and distributed free to its membership. The Editor was J M Bristow. President of the Division was E G Beard with W R Felton as the Secretary. They carried notes about the amateurs from various districts of Australia, technical news, and information including new products, WIA notes on the Federal Convention, also some radio theory, plus articles on amateur radio personalities. Quite interesting!

CLOSURE

Before the Editor starts lifting his pen to erase any of this text I will close off for now. It has been a difficult month to fill the column, having been absent for four weeks did not help and the winter doldrums usually adds to the problems. Activity should pick up soon and there should be more to report.

This months thoughts: *Why does a heated argument create a chilly atmosphere?* and *Sometimes a man gets a reputation for wisdom simply because he does not have enough money to make a fool of himself!*

—73 The Voice in the Hills

Try This!

Tuning Mobile HF Antennas

Tie a length of nylon line to the tip of the antenna before commencing tuning. The length of the line should be a little longer than the length of the car.

Assuming that the antenna is mounted on the rear bumper of the car, drape the nylon line across the top of the car.

Take a VSWR reading of the antenna (using minimum power to reduce QRM). Pull on the nylon line to bend the antenna toward the body of the car and note the new VSWR reading. If the VSWR has dropped that antenna is short. A short antenna is capacitive. Adding shunt-capacitance; ie increasing the capacitance between the antenna and the car body by reducing the distance is the same as adding series inductance.

Use this technique after each adjustment and you will quickly be able to resonate the antenna.

Contributed by Earl Russell VK3BER

MAKE YOUR OWN LABELS

Rob Abel VK2ERA,
106 Derwent Street, Glebe, NSW. 2037.

A neat and simple way to tailor make your own labels for home-brew gear is as follows:

Using ordinary domestic self-adhesive vinyl* (the type used to cover library books, or line kitchen shelves), rub on your chosen label with rub-on lettering transfers,** which are readily available in a wide variety of sizes, colours and styles.

Next cover the lettering with another piece of clear self-adhesive vinyl (with the backing removed), thus making a "sandwich" in which the lettering is the filling.

Cut the label to the appropriate size and shape, peel off the backing of the bottom layer and smooth carefully into the required position. This makes a very neat and tidy label and as the lettering is covered it will not rub off with use.

The label colour is limited only by the colour of the material available.

For instance — on black painted articles clear contact is used for both top and bottom layers with white lettering. I used this method on a small home- brew transceiver with very satisfying results.

* Con-Tact from *Nylex is one type of self-adhesive vinyl.*
** *Lettraset, etc.*

BUSHFIRE NETS

The New South Wales Bush Fire Council has begun installing a series of repeater networks.

The first, at Mount Gibraltar, near Bowral, uses an Australian-made 50 watt talk-through repeater with an output on 467.725 and receive on 458.226 MHz.

Five bushfire control centres, with desk-top trigger base radio systems, now use this repeater for inter-communication.

The system is called *Strategic Radio Network.* During major bushfire operations they provide an inter-service link between the Bush Fire Council, National Parks and Wildlife, Forestry Commission, Police, Ambulance and the Army.

How's DX?

Ken McLachlan VK3AH
Box 39, Mooroolbark, Vic. 3138

It is from good authority that the whole DXCC criteria for their prestigious awards program could be dramatically changed.

I personally feel that this could be for the better, but please John W4FRU and your committee, don't take the attitude of throwing all the old paperwork in the air and saying: "Let's start again!"

Many amateurs from all continents are members of the ARRL and most take advantage of the ARRL DXCC. It would be prudent to seek input from these members, many of whom have attained very large country totals — some even being on the Honour Roll.

When problems arise and arrogance, vitriolic remarks, and belittling a society's awards becomes a talking point across the amateur spectrum, something constructive should, and must, be done promptly.

The ARRL is renowned for its impeccable record of being of assistance to the fraternity and its Awards Program is the criteria for all countries, so please Mr Chairman of the DXCC Advisory Committee, amend the criteria constructively, remembering that the majority, if not all DXing amateurs, have struggled to attain their DXCC standings by spending countless hours chasing elusive countries and trying to get their calls recognised over the associated klangfarbenmelodie, when coming across that rare country where a DXpedition has gone, usually at great expense to the participants. Or, maybe it could be a lone amateur in an isolated location wanting a friendly chat.

Next comes the considerable expense of obtaining the valued card, and the accompanying frustration which accompanies such an exercise — an accepted part of the hobby!

Mr Chairman, you are respected and renowned for your clear thinking — please give this problem considerable thought before any constructive changes are made as your decisions will stand for decades to come.

COCOS (KEELING) ISLANDS — VK9Y

A much sought after QSL confirmation from one of Australia's possessions that consists of two atolls, comprising 27 small coral islands, with an all up area of (5.5 square miles) 14 square kilometres.

This outcrop is located at 12.01 degrees east and 96.50 degrees south — the same latitude as Darwin — and approximately 2 250 kilometres north-west of Perth. Of interest, the highest point is no more than six metres above sea level and it enjoys a hot climate that varies between 22 to 32 degrees Celsius complimented by a rainfall averaging around 2 000 mm. The climate could be considered unpleasant in the December — February period of the year for the 410 Cocos Malays and 220 Australian inhabitants, due to the humidity and rainy season.

The main islands are are named West and Home Islands, with other larger coral islands being called Direction, South, Prison, Horsburgh and North Keeling. Probably each one has its own history and the locals have a name for them all, as they are all regularly visited to harvest the coconuts, which are in abundance on the islands, which are shaped in a horseshoe formation. Within the formation is an idyllic lagoon, approximately 16 by 10 kilometres in area and varies in depth to a maximum of seven metres of bright water, coloured from a bright aqua to a dark green. Outside the perimeter of the horseshoe islands, the Indian Ocean can vary in depth to many thousands of metres.

West Island is the main administration area, containing an airstrip, offices, meteorological station, the homes of government personnel, and a school that covers from pre-primary to secondary and is staffed by the West Australian Education Service.

Home Island, is occupied by most of the Cocos Malays, descendants of those who were brought over when Captain John Clunies Ross, a Scottish seaman, arrived two years after its first habitation by Alexander Hare in 1925.

Hare and Clunies Ross both laid claim to the area, even though the North Island was discovered by the British sea captain, William Keeling of the East India Company in 1609. Hare was defeated in his bid for ownership and left for Java six years later.

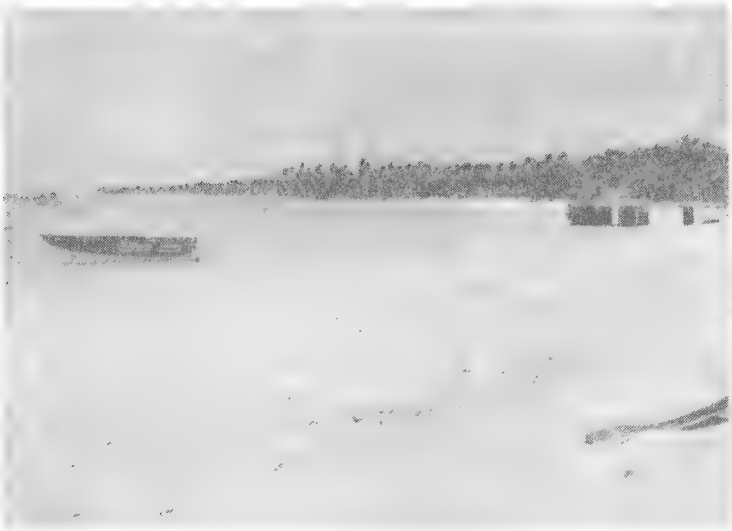
Further history of the island group indicates they were annexed to England in 1857 and in 1886, Queen Victoria granted all land above high water mark to the Clunies-Ross family who nurtured, cultivated and increased the plantations. It was purchased from John Clunies-Ross and his wife Daphne, after five generations of the families rule, for $6.25 million by the Australian Government. John and Daphne, now live in Perth. Many amenities are provided on the islands, including a small but modern equipped hospital, with one resident doctor and two nursing sisters in attendance, a community radio station (VKW), many clubs and a well stocked grocery/liquor store which is replenished on a weekly basis. Produce including fresh fruit and vegetables are brought to the islands by a charter aircraft which also brings the mail. The arrival of this aircraft is the event of the week!

Surface mail, parcels and other hardware are brought in by sea, generally every six to eight weeks.

Amateur radio operation is inconsistent, unless one of the employees happens to have an amateur licence. Over the past years there have been many operators heard from this tiny, much sought after outpost. Some Royal Australian Air Force air crews, such as Alex VK9YA and Paul VK9YB, on stopovers during reconnaissance flights across the Indian Ocean, and individuals such as Frank ex-VK9NYG, have changed the status from 151 to the 51st most wanted country on the DXCC ladder and even the Federal QSL Manager, Neil VK6NE, has done a stint of operating, giving a new country to many DXCC enthusiasts. Amateur operators have to be cautious and considerate in the the amount of power they use, as high power, even within the terms of their licence, can cause BCI, the lifeline of community relations in this confined area.

One, if not the first to initiate the the VK9 Cocos

Cocos (Keeling) Islands from the air.
Photograph courtesy the Royal Australian Air Force



Clean Beaches surround the Lagoon.

The Wharf.

prefix was VK9AJ in 1956. His QTH was on Direction Island, however it is impossible to list all operations from this area.

So when you hear VK9Y., call and say you know a little of the area he or she is operating from, provided the operator has not got the multitudes calling, and they are in the middle of a dog-pile!

Neil VK6NE, relaxing on Cocos.
—Photograph courtesy Neil Penfold VK6NE

HELP! ! !

Information from any operator who can assist with information on the whereabouts of Art ex-ZD1FG, who operated from Njala in 1958.

This information is required by Bill VK1WB, for confirmation of two phone contacts. All replies will be appreciated at Bill's new QTH which is: 8 Eacham Avenue, Paradise Lakes, Qld. 4126. Australia.

The co-operation of overseas magazines and DX news sheets would be appreciated.

FAILURE TO QSL

Joy VK2EBX, notes that she has had no success for the following call signs in the QSL's "In the Bag" department.

9H1EU (bureau); A4XX (bureau and direct); EA8LS (bureau and direct); EA8ANT (bureau), FG4CB/FS via FG7CB (direct); FG7CC (two direct); GD4DPK (direct); J87BS (two direct); JT1AO (direct); PZ1BM (direct); TI9J via TI2J (direct); YN5RR (two direct); and VE1BZV (one bureau and four direct).

Very frustrating, Joy. Unfortunately, it is a way of life that has escalated over the last decade and we have to live with it. On the brighter side, the non-return of cards is quite a low percentage and in my particular case, after much nail-biting at times, the return is 100 percent. Trying to procure cards on other people's behalf, I have to admit, has not been so successful.

With the increase in postage rates, one has to think twice about sending a card direct, however the members of the Institute save with the voluntarily manned bureaus. If they are keen DXers the bureau virtually pays for their membership.

AMATEUR RADIO TO THE RESCUE — AGAIN

In mid-June, Bharathi VU2RBI, a YL operator and Subramanyam VU2VSN, intercepted a Mayday call on 40 metres. They contacted Bruce HP3YM/MM, on board the vessel *Yathi* with a crew of four. The vessel was in trouble and the VUs arranged for fresh water, food, medical supplies and rescue by the Indian Navy. All concluded happily and NIAR is discussing recognition for the above mentioned operators and their helpers for their assistance.

GOVERNMENT SUPPORT

The Indian Government has agreed to assist and subsidise the setting-up of amateur radio centres along the Indian coastline to assist if necessary in a disaster and to fit into the countries Natural Disaster Master Plan. They hope to increase this support throughout the country.

Praise must be given to this Government for their recognition of the part well-trained volunteer operators can play in emergency communications if the need arises.

ST PETER 1 ISLAND

It is believed that Bob KD7P, has been given licence approval for operation from this island in December. He now awaits landing permission from the Norwegian Foreign Department.

Cross fingers and calculate your beam headings, this could be a good one! He also hopes to make the same trip next year.

WILLIS ISLAND

This island is not far from mainland Australia, but has been rather remote with communications for the Meteorological Station staff, when they have had to pass their weather observations back to the mainland.

Not now, as new telephone circuits have been installed that will be relayed by Australia's own AUSSAT satellite. This system is known as *ITERRA* (an aboriginal word meaning 'be quick').

ITERRA will link the island with voice and data access to anywhere in Australia via Telecom's switched telephone system.

MOHELI ISLAND

A new one for the too-hard-basket probably. 5I0A was expected to be operational from this island in July.

The island is located in the Mozambique Channel.

According to research, it is apparently a part of the Comoros group, but it is claimed by Tanzania, thus the 5I prefix which is within their allocation and it could be a possible for being in excess of the 250 mile radius as laid down by the ARRL DXCC Rules.

It is one of those that we will have to work first and worry later about because the examination of claims and relative paperwork as to the authenticity of the Italian operators allocation of a call sign, could take a considerable time.

PRIBILOF ISLANDS

It is unfortunate to report that the issue of the Pribilof Islands is causing some harsh words to be written by Dan Robbins KL7Y, President of the Alaskan DX Association, (ADXA).

In 1983, the AXDA requested the ARRL to add this island group to the DXCC Countries List by virtue of point 2 of Countries List Criteria. After two years, the DX Advisory Committee voted for an acceptance of these islands as a new country. Unfortunately, the Awards Committee of the ARRL were persuaded not to add this to the DXCC list.

There seems to be no rhyme nor reason to the non-allowance considering the Advisory Committee's advice. Why have a volunteer committee and not take their advice? In other words, it is a waste of time for all parties concerned, particularly when volunteer labour is getting harder to come by.

Space does not permit the full context of Don's letter to be reprinted but could it could be another 4U1VIC debacle repeating itself. Let us hope not, but hold onto those Pribilof cards in the interim, if you were lucky enough to make the grade with an entry in the log at the time.

CHINA

BY5QH, was due to commence operation on August 20, and BY5HZ is scheduled to send RF up the coaxial cable this month. At the time of writing these notes, unfortunately no QSL information is available but it is nice to see more BY stations participating in the hobby.

John Cieh, the Chief Operator at BY4AOM, is assembling a 2 kW linear amplifier. John is receiving much assistance from Tom Wong VE7BC, the person, who in my opinion deserves complete recognition for getting BY back on the air. Tom still makes regular trips to China.

BY4AOM is QRV on both 20 and 15 metres, frequently looking for VK stations.

Any amateurs visiting China are made most welcome as guest operators at many of the amateur radio stations such as, BY1PK, BY4AA, BY4AOM, BY4RA, BY4RB, etc.

Further information may be obtained by sending three IRCs and a self- addressed envelope to Bob Winn, Editor, *QRZ DX*, PO Box 834072, Richardson, Texas, 75083. USA. Endorse the envelope, "BY Station Information."

UNUSUAL PREFIXES

You were not hearing things as SJ9WL and LG5LG were legitimate CW and SSB calls being aired by the Norwegian Handicapped Radio Amateur Club (NIHRAH). They were operational from Morokulien in July.

UNICEF

The UNICEF 'gang' planned an operation from Godavari, in Nepal, using the call sign of Father Moran 9N1MM. The operation was to be during the first week of August. Please do not QSL to Moran or his Manager on this one but direct or via the bureau to the operators instructions.

AM0EEE

Another new prefix and suffix was due to aired from August 4- 15, to commemorate the entry of Spain into the ECC. Special calls from various parts of Europe with special QSL cards were scheduled as follows:

4th — Madrid, 5th — Paris, 6th — Lisbon, 7th — Brussels, 8th — Luxemburg, 9th — Rome, 10th — Bonn, 11th — London*, 12th — The Hague, 13th — Athens, 14th — Dublin and 15th — Copenhagen.

QSLs to be sent to EEE, PO Box 2071 cp, 50080 Zaragoza, Spain.

** At the time of preparing these notes, the UK licensing authority had no knowledge of any operation and therefore it would appear to be illegal in the UK. The status of other countries is unknown. Another case of wait and see. Late unconfirmed news is that a UK licence would not be allowed.*

CARDS RECEIVED

Steve VK2PS, has not had much time to operate of late. However his collection of cards is growing, mainly from using the VI prefix. Some of the cards received are 5W1EJ, 6Y5MS, 8J3JST (The 100th Anniversary of Japan Standard Time), 8S7BSJ (Boy Scout Jamboree in Japan), HI1FYH, JT1BH, LZ2KTS, OE5BGL, VE7EXPO, VO1CA, VR6TC, VS6AD, VS6TQ, YE3C (40th Anniversary of Indonesian Signal Corps), XE1AFQ, XO3IY, XX9DX, YO6AKN, YO7BSN and ZK2KH.

MOUNT ATHOS AGAIN

Well known DXers, I0DUD, I0IJ, I0ER and I0GPY attempted to activate the much wanted and discussed Mount Athos country last month. They had more than adequate equipment organised and were progressing favourably with the Greek authorities until the local society apparently objected and the whole project was aborted.

Incidentally, there seems to be a jinx on operations from this area. Perhaps, as one of the Monks is an Australian, some VK operation may succeed, but apparently it is not as easy as that as all the different groups of Monks have to agree and then get the approval of the SV Society.

All the paperwork for the last operation is in ARRL hands and there should be an answer soon. Apparently it is fairly similar to previous expeditions paper warfare but it is a case of wait and see. Not an unusual occurrence for the DXer!

BITS AND PIECES

The **4U1VIC** controversy is still on the boil. . . * * **Martti OH2BH**, was active from the new QTH of **Mike 5B4TI**, for the **European CW Contest**. * * **8O2**, is a special prefix for the 20th Anniversary of Botswana's Independence and will be used until the end of this month. * * **Gerben PA0GAM**, was operational from the Sudan last month, using the station at the Youth Palace — **6T2YP**. * * **XU1SS**, is still operational on an irregular basis. */* I spoke with **Brian BERS 86037**, whilst he was in Melbourne on business and he hoped to be signing as **VP8BGT**, from the Falklands later this year. * * The station signing **VK9VO**, supposedly from Christmas Island is very suspect! ! * * **Arnold WB3DAO**, is looking for friends in VK to exchange stamps and stickers with. His QTH is **PO Box 700, Jessup, MD 20794, USA**. * * Unfortunately the published address of **KG4TR**, may be incorrect and it is not listed in any publication. * * Apparently their is a film titled 'Agent Vikram' presently being screened in India, which shows our hobby in a bad light, with the emphasis being on an anti- social and anti-national theme. It is possible that this film may be released in other countries including VK, under another title. * * Four French operators hoped to activate **Clipperton** towards the end of last month, whilst en route from San Francisco to Acapulco, on a French Naval vessel. * * Have you heard **P5AGJ**? He is giving his QTH as **PO Box 1216, Heungman, North Korea**. Another question — is he genuine? If the paperwork is correct it could be a new DXCC country. If not, the name of his town may be appropriate if a few avid DXers track him down. * * **Ron ZL1AMO**, hopes to be active from **VK9X Christmas Island**, this month. * * **Jean-Paul 5R8JD**, went QRT on August 15, leaving **Alain** to carry the 5R8 banner. * * **Hiro**, formerly **JA1WTR** and **VU2WTR**, is now stationed at the Japanese Consulate in Singapore. What call this time, Hiro? * * Another operation from **Cocos TI9**, is possible in the near future. * * The **OH0/OJ0 DXpedition** made 18 257 QSOs during their stint and lived through a horrendous storm. They lost a tower in 70 MPH winds, which was retrieved, but had considerable damage. The beam and 160 metre antennas are still somewhere in the Baltic Sea.

QSL AND QTH NOTE

Every effort is made to check the authenticity and correctness of addresses and QSL managers published in *Amateur Radio* but it is emphasised that the magazine or the writer cannot be held responsible for incorrect addresses, wrong managers or non return of cards.

QTHS YOU MAY NEED

3C0A	TR0A, PO Box 1826, Libreville, Gabon.
4V2BM	PO Box 1419, Port Au Prince, Haiti.
4X5J	PO Box 4099, Jerusalem, Israel.
5R8JD	TU2NP, PO Box 1518, Abidjan 01, Ivory Coast.
5V7JJ	PO Box 30, Niamtougou, Toga.
5W1FT	PO Box 184, Apia, Western Samoa.
5Z4DD	PO Box 30270, Nairobi, Kenya.
6T2MG	PO Box 49, Khartoum South.
6W2EX	F6EYS, 8 Rue du General Ganeval, F-91290 Strasbourg Ville, France.
8P6GI	KA6V, 93787 Dorsey Lane, Junction City, OR 97448, USA.
A35SA	PO Box 1553, Nuku'Alofa, Tonga, South Pacific.
A4XOS	ROARS, PO Box 981, Muscat, Sultanate of Oman.
BY4SZ	PO Box 51, Suzhou, Peoples Republic of China.
C30C	F8RV, 14 Bis Ave General Compans, F-31700, Blagnac, France.
CN8LS	PO Box 3007, Casablanca, Morocco.
CO7JC	PO Box 5343, Camaguey, Cuba.
D44AD	Rua 5 de Julho, Praia, Republic of Cape Verde.
DV7CE	PO Box 238, Bacolad City, Philippine Islands, 6001.
EP2DL	PO Box 17845-151, Teheran, Iran.
FK8A	PO Box 3956, Noumea, New Caledonia, South Pacific.
FO0ASJ	N5DD, 3008 Southwestern Boulevard, Dallas, TX 75225, USA.
HH9E	PO Box 243, Fort Liberte, Haiti.
HP8RHT	PO Box 80, Aquadulee, Panama.
J28DQ	PO Box 2722, Djibouti.
J87CD	PO Box 975, St Vincent, Windward Islands.
J88AC	PO Box 142, St Vincent, Windward Islands.
JY8NT	PO Box 146, Cambridge, England.
KH6JEB/KH7	KH6JEB, 95-161 Kauopae Pl, Mililani Town, HI 96789, USA.
KP2AH	WA2YMX, 3465 Carrolton Avenue, Wantagh, NY 11793, USA.
S84MP	6 Ebony Street, Umtata, Transkei
SV5OX	PO Box 251, Rhodes Island.
SV5TX	PO Box 251, Rhodes Island.
SX1MBA	RAAG, PO Box 3564, GR-102 00, Athens, Greece.
TA2L	Ustun, SOK 11, Ayranci, Ankara, Turkey.
TI8CBT	PO Box 119, Puntarenas, Costa Rica.
TL8HZ	PA0ZBL, Vissersdijk 13, NL-3319 GT Dordrecht, Netherlands.
V3EE	PO Box 852, Belize City.
VQ9ZZ	N4GNR, PO Box 433, Toccoa, GA 30577, USA.
W3HNK	PO Box 73, Edgemont, PA 19028, USA
W4FRU	PO Box 5127, Suffolk, VA 23435, USA.
WH8AAP	PO Box 8, Pago Pago, American Samoa, 96799 USA.
YASME	PO Box 2025, Castro Valley, CA 94546, USA.
YK1AO	PO Box 245, Damascus, Syria.
XT2BR	F6FNU, 7 Res du Val, Ollainville, F-91290 Arpajon, France.
YM3KA	PO Box 937, Izmir, Turkey.
ZC4AP	JSB, BFPO 53, London, England.
ZK1AL	PO Box 90, Raratonga, Cook Islands, South Pacific.
ZK1XV	VK2BCH, PO Box 344, Forster, 2428, New South Wales.

QSL TO

1A0KM:I0MGM, 1Z9A:W7PHO, 1Z9B:W7PHO, 1Z9D:W7PHO, 1Z9E:9V1VY, 3A2EE:F9RM, 3A2GX:I2YAE, 3A2LF:JH2QFI, 3A2TA:F8CL, 3A3WPX:DJ9JB, 3B8DB:K5BDX, 3B8FE:3B8CF, 3C1YL:N4NX, 3D2AB:WB8WMS, 3B8MS:VE3TEN, 3C1YL:N4NX, 3D2HE:VE3FXT, 3D2RF:VK3VU, 3D6BF:LA7IL, 3V8ZY:IN3RZY, 3X3JA:JA1HGY, 4A1HC/2:AA5B, 4A2Q:XE2AQ, 4C1XWS:XE1CWS, 4K0A:UA1MU, 4K0B:UA1MU, 4K0COC:UA3AOC, 4K1GAG:UQ2OC, 4K1QAV:UA1QAV, 4M4A:K3UOC, 4N0IARU:YU4FRS, 4N3KV:YU3JS, 4O0IYY:YU2AKL, 4O1WCY:YU1FJK, 4O2WCY:YU2DX, 4O3WCY:YU3ER, 4O4WCY:YU4EBL, 4O5WCY:YU5CXY, 4O7WCY:YU7AJD, 4O9WCY:YU7BCD, 4O4I:YU4EGZ, 4O4M:YU4EGZ, 4S7VK:DJ9ZB, 4T3S:OA4CIT, 5H3ZR:OH6IQ, 5V7AS:IT9AZS, 5V7HT:HB9TK, 5W1EE:W6OUL, 5X5MB:G0BNA, 8R1L:DJ6BC, 8R1Z:WI4K, 9N1MM:N7EB, 9U5JB:ON5NT, 9Y4DX:AG1J, A71AA:DJ9ZB, A71AM:DJ9ZB, BV2FA:DJ9ZB, CO5GV:W3HNK, CQ6OF:WA3HUP, CQ6UW:WA3HUP, A35NK:K6KEW, CS1OF:WA3HUP, D68WS:DJ6QT, DF8AN/3A:DF8AN, FM5DZ:F6FNU, FM4DR:F6FNU, HZ1TA/GO1:I8YCP, KC6CM:I5JEO, KR7Q/KX6:KR7Q, OD5BP:DL1FZ, OH0MD/OJ0:OH2BH, IM0JOO:IS0WON, J40DT:SV0 Bureau, K8MN/OH0:WA8JOC, P43DO:PJ3DO, PA3DZN/3A:PA3DZN, SV0AC/SV9:AA4LU, VK0SJ:VK7RM, XE86ALH:XE1ALH, XQ5CFR:CE5CFR, ZC4AK:Bureau, ZC4CZ:G4MGQ, ZV2BW:PT2BW, ZV2KT:PT2KT, ZV2ADV:PT2ADV.

* QSL NOTES: (1) SM2EKM is still the Manager for SM2DWH/S2 (1974). Cards are still available and it is valid for DXCC. (2) VE3EWY, is still the Manager for VP2KU (St Kitts 1972). Cards are still available.

MACAU — THE FUTURE?

The future of XX9, formerly CR9, with a population exceeding 400 000, is at stake.

The 15.5 square kilometre tourist area, likened to Monaco because of its casinos and easy way of life, is dependent on its neighbours, and most particularly Hong Kong, some 60 kilometres away, so much so that its currency, the Pataca is 'tied' to the Hong Kong Dollar for tourist trade and massive investment.

Macau, unlike Britain's lease of Hong Kong which expires in 1997, has been under Portuguese rule since the 16th century when the Chinese, according to the Portuguese authorities, granted them title to the area in 1557, however any documentation has been purposely mislaid or just lost, if it did exist.

In 1976, the Portuguese government of the day agreed to release the area to China, but have still carried on their rule as before. However, in the 1984 general election eight Chinese out of the 17 member Legislative Assembly were elected. Maybe this is not surprising as some 95 percent of Macau's stable population are ethnic Chinese, with the balance being Portuguese and Macanese.

It is interesting to note that, although the legal system and official language is Portuguese, most of the inhabitants speak Cantonese.

A meeting in July between the two interested countries achieved very little and it is hopeful that talks scheduled to be held in Peking last month may have been fruitful in resolving a smooth transition for the populace.

Undoubtedly, there will be a change of ownership and another prefix will be issued to delight the prefix hunters but how will the new administrators resign themselves to casinos, trotting tracks and other attractions which is not part of their lifestyle.

It is felt that it will be a wait and see situation, depending mainly on economics and as to how it affects the neighbouring populace.

THANKS

Sincere thanks are extended to the following:

The Editors of weekly, biweekly and monthly newsletters including the ARRL NEWSLETTER, BARG, CQ-QSO, DX FAMILY FOUNDATION NEWSLETTER, INSIDE DX, JAN and JAY O'BRIEN'S QSL MANAGER LIST, KH6BZF REPORTS, LONG ISLAND DX BULLETIN, PAPAKURA RADIO CLUB BULLETIN, QRZ DX, RSGB DX NEWS and THE WESTLAKES AMATEUR RADIO CLUB NEWSLETTER.

Magazines including, BREAK IN, cqDX, DX POST, JA CQ, JARL NEWS, KARL NEWS, QST, POLICE LIFE, RADCOM, VERON, WEATHER NEWS and WORLDRADIO.

Members who have contributed include VKs 1WB, 2PS, EBX, 3PC, YL, L30042 and VK6NE. Sincere thanks to one and all who have made this months column possible.

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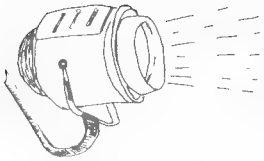

Spotlight on SWLing

Robin Harwood VK7RH
52 Connaught Crescent, West Launceston, Tas. 7250

As you have probably noticed, there is a new address under the Masthead. I am now living in the western suburbs of Launceston. Although I am writing this six weeks before moving into the new QTH, preliminary indications are that it should be satisfactory.

Conditions of late have improved, although the QRM on the lower frequencies, particularly noticeable in summer months, is starting to be heard. Fortunately, conditions on the higher frequencies will improve to make up for the tropical bands being too noisy. I also suspect that we have emerged from the bottom of the Sunspot Cycle, as a number of spots visible on the Sun's surface, are slowly increasing.

BUSY, BUSY, BUSY!

This month of October is a busy one for the amateur. Firstly, the annual VK/ZL Contest, with the Phone Section on the 4th and 5th and the CW Section, one week later. On the 18th and 19th we have the annual JOTA participation. This year, because I will be away on my honeymoon, I will not be participating as VK7RH/P. It will be my first break from JOTA since 1973.

CHANGING THE TIME

At the end of this month, we see the re-introduction of Summer Time in VK2, 3, 5, and 7. This corresponds to the end of Daylight Saving Time in the States on the same day. DST ends officially in the UK on the 19th. Those interested in trying to get those elusive Brazilian DX catches, note that Summer Time was also introduced there as an energy conservation measure last November. They may do it again this month!

COLLECTORS PIECES

I recently received details from William Perleberg L70043, of "Sunrise Gardens", Fern Tree, Tas. 7101, concerning details of Radio Beijing utilising a French Guiana relay for their programming to North America. The Montsinery site of Radio France Internationale was reportedly using 11.980, 15.230, and 15.445 MHz at 0300 UTC. Also, RFI was able to utilise Chinese HF transmitters as a consequence of the trial reciprocal broadcasting agreement. If you wish to hear these broadcasts now, you are too late as the new French Government, under M. Jacques Chirac, was unable to reach agreement on continuing these reciprocal privileges.

If you are lucky enough to obtain QSLs for RB, via Montsinery or RFI via China, hang on to them as they will be collectors items. France is reportedly going to construct relay facilities in Sri Lanka. These are going to be in the southern part of the island nation, well away from the troubles of the north, which have plagued the Deutsche Welle site at Trincomalee.

FURTHER TO . . .

Whilst we are on reciprocal agreements, yet another Asian broadcaster recently signed an agreement to utilise transmitter sites in North America. Radio Japan and Radio Canada International will exchange programs over each others senders. At the present time, I am aware that Radio Japan (NHK) will commence relaying from the Sackville site in October or November, to relay their North American programming. The Sackville site is also used by the BBC and DW to relay programming to the same target areas.

HOT WATER

Presumably RCI will use the NHK facilities to beam programs to Asia. Until recently, this area has been largely neglected by Canada. They commenced producing a Japanese commercial program, which is aired via Radio Tanpa, the Japanese commercial shortwave broadcaster, on a weekly basis.

Also, a Chinese language program and English/French information has been aired over cable systems in Hong Kong occasionally. Both, I believe were produced in Vancouver, BC. Incidentally, RCI got onto a little hot water with its US audience following plans to axe releases to the US. The reaction to this Budget Saving measure has taken RCI by surprise. Apparently, there are more listeners in the US than they thought!

WATCHING THEIR Ps and Qs?

Looking at the August issue of *Monitoring Times* which is published by Bob Grove, a well-known DXer, I see that the Bills in the US Congress are rapidly speeding towards ratification in the Senate. It aims to prevent casual radio listeners from intercepting mobile phone calls or remote broadcast links. If the Bill becomes law, an SWL could face up to a year in a Federal Prison and a US$10 000 fine, if convicted of violating the Communications Privacy Act.

This Bill is designed to protect the privacy of Mobile Cellular Phone Systems which operate around 800 MHz. Many hobby groups are fighting provisions in the Bill which will restrict their monitoring activities in the legally-receivable spectrum. They suggest that instead, cellular system owners develop and install electronic or digital encoding to enhance the privacy of phone calls. It was unfortunate that one scanner manufacturer advertised the fact that his models were able to intercept the Cellular Mobile Frequencies. This made the US legislators angry and eager to enact the Bill. The company subsequently withdrew the offending advertisement. At deadline time, it is still unclear if the Bill has become law in the US. I will keep you informed.

I also note that cordless phones are continuing to be a problem. Recently, American police dispatchers began to receive calls from "phantom dialers" who locked up the police switchboards. It soon transpired that, when the batteries on a cordless phone get weak, they are susceptible to pulses from household electronic appliances such as microwave ovens, etc. They then begin dialing random digits, usually 911, which happens to be the emergency phone number over there.

I wonder if similar problems have been encountered here? I have certainly experienced problems from second, third or fifth harmonics from them falling within the 80, 40, and 30 metre amateur bands, often landing on a weak DX signal.

Well, that's all for October. Until next time, the best of 73 and good listening!

—Robin VK7RH
ar

Education Notes

Brenda Edmonds VK3KT
FEDERAL EDUCATION OFFICER
56 Baden Powell Drive, Frankston, Vic. 3199

Statistics for the May examinations were received recently. It was very pleasing to see that the Novice pass rate was again up to where it was some time ago.

For the interest of those keeping track of such matters, I present a summary of the theory results and some comments.

VK	AOCP SAT	AOCP % PASS	NAOCP SAT	NAOCP % PASS
1	6	50	3	33.3
2	75	37.3	64	67.2
3	73	28.8	50	50
4	56	35.7	29	65.5
5/8	24	16.7	19	26.3
6	37	29.7	25	52
7	2	0	8	50
TOTAL	272	32	198	55.5

The AOCP pass rate is still low, however.

It becomes more interesting when we look at it in terms of the examination papers used. For Victoria and New South Wales, three papers were used, one for each capital city and the other for the country centres, so it is difficult to compare their results on a state basis. However, the AOCP paper used for the country centres was also used for all the examinations in both Queensland and South Australia/Northern Territory, resulting in widely differing pass rates at both levels.

This suggests that there is a "Quality of Student" factor, but for the regulations examination, VK5/8 had 58.3 percent pass to 41.4 percent for VK4.

Is there a statistician in the house?

The variations between examinations by state are often greater than the variations between states for the same examination. Unfortunately, I do not have time or background to go into much depth in these analyses, but if any reader wishes to go further, I would be very interested.

Readers may have noticed that we do not have a sample examination paper this month.

Most of the papers that have been prepared over the years have now been published. I intend to start producing some more, but have not had a lot of feedback on whether or not the regular publication should be continued. I would appreciate comments on this, and I would be more than pleased to receive questions which could be used in sample papers.

—73 Brenda VK3KT

AMENDED JOTA CALLING FREQUENCIES FOR AUSTRALIA

80 metres — 3.590; 40 metres — 7.090, 20 metres — 14.190; 15 metres — 21.190; 10 metres — 28.990 MHz.

Remember JOTA is on the 18th and 19th of this month. Please participate!

TECHNICAL MAILBOX

Many readers would have read the letter from Albert VK6ARD, of Cottesloe, Western Australia, in last month's *Over to You!*. Albert suggested that AR "devote space to a section of our excellent magazine to a Question and Answer session."

Well Albert, we have done just that! Your letter gives heart to us that we were not alone in the idea.

To Albert's suggestion of the best way of cutting "foam plastic", one further suggestion — for safety reasons, I suggest that this is a job to be undertaken only when your wife is out shopping! ! !

Now, in reply to your questions, Albert. . .

. . .Albert asked why his power supply zener diode and fuse blows regularly when powering his two metre, 25 watt transceiver. The power supply is rated at 6-8 amps. Boy! This is somewhat difficult to answer without a circuit and component list! Write us again Albert and I am sure we can provide the answer.

In the meantime, study the circuit and check the component ratings. If it is a simple shunt, zener regulated supply, measure the zener current. Is it within its rating? (viz dissipation too high?). You would not be the first to be an owner of a commercially engineered "bomb."

Maybe, as you specifically mention two metres, it could be a function of the RF from the transceiver somehow finding its way across the zener. Perhaps inadequate earthing, high SWR or a quarter wavelength multiple DC supply lead has a bearing on your problem. If this is so, then RF bypass the zener, improve your earthing and SWR or use a shielded cable for the DC power feed. Without a "mud map" further help is a little limited. If the suggestions do not lead you to a cure, as I said earlier, write again. It is well to remember that such problems always have an answer even though it may require several minor changes to effect the remedy.

As a sideline, it was once said of one manufacturer that, after the design engineers completed the prototype unit, the "sales engineers" moved in. They commenced removing each component (individually). Finally, with a box full of "redundant spares" and after the unit failed, that the last component was then replaced to provide the production-line model! Perhaps things have not changed very much with modern trends, regardless of the drop in minor component prices?

Albert also asked why "it is necessary to have, in an ATU, a variable capacitor in series as well as in parallel?"

I cannot figure out just what configuration you are referring to in this case. Sorry Albert, but further information is necessary on this one please!

VK2 . . ., of Epping, New South Wales, writes of problems he has experienced on 14 MHz with incessant breakers coming in from North American stations, whilst working across Australia.

Normally this column addresses only "technical matters" however, perhaps we can see our way clear to add a paragraph or two on operating techniques!

Since the "American Phone Band" has been extended down to 14.150 MHz, it has at times become fairly crowded. In some cases it is not always possible to choose a lower band to chat to your long-time friend and thus you are faced with operating on a "DX-Band."

It is always best to contain oneself when breaking in on a QSO. Some do just that — break-in. Remember to listen and find out what the stations are talking about and then only if appropriate knock gently and wait to be invited into the QSO. Don't crash right in. If two operators are engrossed in a technical discussion or are talking of matters which are of little common interest to you, don't crash the door in just to get a report on your latest shack change. Don't be lazy! Find a clear channel and call for a report. You will normally get a response.

Now back to your original problem — the arrogant breaker! This may help! He is probably just finished putting up his six element beam at 40 metres, receiving your 100 watts at S9 +20 and wants to know if his 2 kW can get to "down under." Query the breaker, then respond to a "mobile station" in the breaker's call area. Ignore him! Compliment the mobile station on his 9+ signal from his two metre whip, etc. After this QSO, go back to the breaker. Take a couple of overs to get his call sign and another couple to get his name and a R3 S3 should seal the situation! He will disappear to look for the "problem" and allow you to continue your QSO! ! !

Australian Ladies Amateur Radio Association

Joy Collis VK2EBX
PUBLICITY OFFICER, ALARA
Box 22, Yeoval, NSW. 2868

ALARA BIRTHDAY YL ACTIVITY DAY

Our Birthday YL Activity Day on July 26, was very pleasant and we were able to catch up with several DX members, mainly Canadian, American and New Zealand YLs.

Several "semi-nets" formed, and we had the opportunity to chat to some of the girls we had not heard from in a long time, plus meeting others for the first time.

Unfortunately, propagation was not all that good, very little being heard on 10 or 15 metres. The main DX activity was on 20 metres, with VK and some ZL activity on 80 metres later in the day.

I heard no European stations at all, which was very disappointing. It would be interesting to know if anyone did have a European YL contact during the course of our Activity Day.

Although not too many ALARA members were able to participate in our special birthday celebration, those who did had a most enjoyable time; so much so that we are seriously considering another such Activity Day for our next birthday.

ALARA CONTEST

With the ALARA Contest just around the corner, it may by an opportune time to remind everyone about the special trophy to be awarded for the highest aggregate score over five years of a licensed YL operator (not necessarily Australian). The year of commencement was 1983.

Our Contest Manager, Marlene VK2KFQ, has compiled a progress report to remind us all that the five-year trophy award is still running, just in case any of us might have forgotten.

Here are some of the aggregate scores so far:

Wendy VK4BSQ	2818	Helene VK7HD	932
Kim VK3CYL	2401	Valda VK3DVT	921
Gwen VK3DYL	1667	Jenny VK5ANW	859
Mavis VK3KS	1383 + 1 check log	Denise VK5YL	677
Joy VK2EBX	1238	Elizabeth VE7YL	564
Bev VK6DE	1235	Poppy VK6YF	478
Freda VK2SU	1014	Joyce VK2DIX	428
Val VK4VR	979	Pearl ZL2QY	214

CW operators do have an advantage when it comes to scoring, because all points are doubled for CW contacts. Novice YLs have the additional award to compete for — the Florence McKenzie CW Trophy. Two very good reasons for getting those CW keys dusted down and into operation, ladies.

ACTIVITIES

A very pleasant ALARA Birthday Get-Together was organised by Meg VK5AOV, for VK5 members, beginning with a smorgasbord lunch at the Belaire Hotel and concluding at the QTH of Joy VK5YJ, for afternoon tea. A most enjoyable time was had by all, even if it did leave them all feeling somewhat 'fed-up.' (All that food creates havoc with diets).

The VK3 girls attended a luncheon to celebrate ALARA's birthday, and enjoyed a delicious meal. There was probably as much talking as eating, and the function was pronounced very successful and enjoyable. Plans are afoot for another luncheon next year.

(After writing this I am beginning to feel a bit hungary myself — excuse me while I go and make a sandwich).

Congratulations to Maria VK5BMT, who has achieved the South Australian Jubilee 150 Award on VHF.

Congratulations of a different sort to our Contest Manager, Marlene VK2KFQ, and her OM Ron VK2EFJ, whose little harmonic, Kate Laura was born on July 2.

There were 15 ALARA members, including Celia ZL1ALK, joined into the ALARA Birthday Net on July 28. Quite a good attendance on such a cold, bleak, curl-up-by-the-fire sort of night.

JOTA

This is Jamboree-on-the-Air month, JOTA being held on Saturday, October 18 and Sunday, October 19. Many ALARA members involve themselves with this activity, which is usually enjoyed by Scouts, Guides and amateur radio operators alike. If you have never tried JOTA and would like to participate this year, contact your local Guide or Scout Troop or your WIA Divisional Office.

NEW MEMBERS

Additions to the membership list (July AR).
VK3 Associate member — Margaret Hamilton, July 20, 1986.
Angie G0CCI, February 25, 1986.
Welcome to Margaret and Angie.

—Until next month, 73/33, Joy VK2EBX

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The SN 2000 is a NiCad battery with a built-in solar panel.

This D-size NiCad supplies a full capacity of 1.2 volts at 1.2 amp hours.

In full sunlight conditions, it charges at half the normal recommended wall plug charge rate, or where mains power is available it can be charged in the normal manner.

Parallel or series solar charging is possible because each cell charges individually, and with the use of protection devices during discharge, offers the option of building solar systems of almost any voltage or amp hour rating using these single cell NiCads.

Impact and weather resistant, with good high/low temperature performance and a service life that exceeds IEC 285, the SN 2000 is suitable for any application requiring reliable power.

From *Electronics News*, July 1986

RESULTS of the 1985 VK/ZL/O CONTEST

OVERSEAS PARTICIPANTS

Greg Williams VK3BGW
WIA VK/ZL/O CONTEST MANAGER
1 Noorabil Court, Greensborough, Vic. 3088

These are the DX results for the 1985 VK/ZL/O Contest. As mentioned previously, the conditions for the Phone weekend were terrible and slightly better for the CW Contest.

The standard of logs was very high and I thank all those who took the time to enter a log.

The purpose of this contest is for VK/ZL and Oceania stations to contact DX stations around the world and this would not be possible if DX station did not participate.

Call signs printed in **bold type** will receive an award and these will be posted shortly.

As this is my last VK/ZL/O Contest as Manager I want to thank all those who have helped me, and in particular, Jock White ZL2GX, the NZART Awards Manager, who will be doing the work for the 1986 Contest. So, remember to send your log to him at 152 Lytton Road, Gisborne, New Zealand.

MODE — PHONE

EUROPE

CALL	BAND	SCORE	CALL	BAND	SCORE
OH7AB	*	3232	JE6MQW	*	33698
HB9ADD	*	2736	JA7YFB	*	30240
CT4NH	*	2470	JA9YBA	*	12980
HA7KLG	*	2016	JA2BNN	*	9504
DJ3HJ	*	2016	JH7LRS	*	5760
HA6NP	*	1950	JA7YCQ	*	5544
SP5PBE	*	1547	JA6BIF	*	4290
LZ2KIM	*	705	JA1RZN	*	3950
HB9IK	*	700	JE2IEQ	*	3162
G3KSH	*	408	JA0URR	*	3100
LZ2JE	*	192	JA2YDC	*	2754
IV3YYK	*	98	JR3BOT	*	2268
YO3DC	*	96	JR1ZTT	*	1240
SP6CIK	*	84	JA4YPE	*	1092
SP6JZB	*	84	JI1WLL	*	1040
YO9HT	40	80	JA1AAT	*	546
HA4KYN	20	238	JA1BUI	*	504
OH6IU	20	160	JH3DEJ	*	192
PA0DJC	20	126	JE3CEC	40	4
PA0ZH	20	90	JA1BNW	20	160
SP5KVW	20	45	JA4GXS	20	70
			JA7FAS	20	40
			JA1OYB	20	8
			JA9ZGZ	10	2

JAPAN

NORTH AMERICA

W0KEA	*	10710

OCEANIA

KA3DRR /DV2	*	297440

OTHER

W2FCR	*	286
K6UO	*	180
HL1APR	*	1728

USSR

UW0MF	*	12760	UM9MWO	*	468
UA0LCZ	*	12376	UT4UWK	*	280
UH8EA	*	11592	UR1RWX	*	180
UA9YX	*	10580	RB5QQ	*	152
UA0SAU	*	7488	UP1BWC	*	144
UZ0CWW	*	7448	UA0TO	*	108
UZ6LWZ	*	5070	UA9HTT	*	50
UZ0LWX	*	3304	UB5IFN	*	18
RA0FA	*	3060	UQ2HO	40	30
UQ2GM	*	2622	UV3CE	20	1710
RL8PYL	*	2120	UA9OO	20	480
UM8MO	*	1729	UZ9OWD	20	468
UP1BZZ	*	1320	UZ4WWB	20	340
UZ9UZT	*	1232	UZ3TWT	20	320
UZ0LWG	*	1080	UL7LW	20	72
UL8LWZ	*	986	RR2RU	20	50
UZ4FWO	*	740	UA3TG	20	12
UL8LWA	*	550	UZ9CYP	20	12
UB3IWA	*	510			

SWL — ALL MODE

VK J HAGAN	*	69372			
UP2 038 1580	*	9792	OK3 13095	*	528
JA0 KAMAGAI	*	5364	UT5 187 1	*	321
UA0 166 505	*	3904	NL 8992 R33	*	320
UB5 066 286	*	2714	UT5 186 100	*	280
UC2 006 43	*	1425	UA3 137 988	*	276
UA6 150 767	*	1320	ONL 383	*	54
UD6 001 220	*	1176	OK1 11861	*	40
WIA L30371	*	540	FE 3060	*	26

We thank the following stations for their check logs — HA4XX, RA4PC, RR2RX, SM6KMD, SM6OOI, UA3DJS, UA3XBB, UA9LT, UB4JO, ZL2BGO, ZM2AGY, ZM2ALF

MODE — CW

EUROPE

CALL	BAND	SCORE	CALL	BAND	SCORE
SM4CMG	*	3565	OK2QX	*	84
HA7KLG	*	2736	G5MY	*	75
HB9CJG	*	2300	EA2CR	*	72
HB9IK	*	1764	PI5PVI	*	72
LZ2KIM	*	1581	EA5CLO	*	70
OK1VD	*	1440	EA5CKP	*	48
SP5PBE	*	1377	LZ2HK	40	132
OH1TN	*	1140	EA7XC	40	60
DL1SV	*	884	LZ2JE	40	30
OK1MAW	*	882	OK1KOK	40	12
OH5PT	*	260	PA3BHS	20	48
OK2BSG	*	256	OH9PN	20	48
OK2BCI	*	234	HA5LZ	20	40
YO3CD	*	220	OE1TKW	20	40
G3KSH	*	208	OH7NW	20	36
OH3JF	*	204	OK2BWZ	20	30
EA2IA	*	180	OK2BMA	20	18
YO8DDP	*	168	OK2PMM	20	8
SP6CIK	*	84	PA3DKX	20	6
EA1AUI	*	84	OK1KZ	20	2
SP3LWU	*	84	OZ4OC	20	2

NORTH AMERICA

W0KEA	*	8740
K3ZO	*	3600
KF1Z	*	2288
KA7T	*	660
K2SX	40	252

OCEANIA

KA3DRR /DV2	*	164400
YC2FEA	*	12768

OTHERS

LU1EWL	20	2

JAPAN

JA7YFB	*	21390	JR4ISK	*	920
JE6MQW	*	18360	JA4GXS	*	900
JH7WKQ	*	11856	JA2YDC	*	896
JA0DAI	*	9400	JA2UOT	*	504
JR1ZTT	*	8400	JA1AAT	*	468
JA5EGX	*	8280	JA9YBA	*	336
JR3BOT	*	8148	JA7FAS	*	336
JA6BIF	*	7426	JA7KM	*	32
JR1IOS/4	*	4410	JA3YBF	40	1036
JA2PSV	*	4032	JR4SRW	20	630
JJ3JJL	*	3990	JA2KPV	20	616
JA6GU	*	3422	JO1QZI	20	418
JA7YCQ	*	3016	JK1LUY	20	320
JA2YMA	*	2900	JH3DEJ	20	90
JA8SW	*	2704	JA1VZM	20	64
JA1YAD	*	2500	JE2MDE	20	50
JR8OJZ	*	2184	JA1BNW	20	48
JA2DN	*	2070	JA0URR	20	36
JA1BUN	*	1120	JA1OYB	20	2
JA3ARM	*	1080	JA1YAG	15	100
JA7YFH	*	930	JG3SVP	15	12

USSR

UZ0FWA	*	13440	UR1RWX	*	621
UZ0CWA	*	12295	UA4HNP	*	588
UA0SAU	*	11340	UT4UWK	*	572
UW0LT	*	11340	UJ8JA	*	442
UZ0CWO	*	8400	UB5TN	*	400
UZ0QWA	*	8190	RR2RW	*	352
RA0FA	*	7740	UR2RND	*	320
UZ0LWX	*	7538	UZ1TWB	*	300
UP1BZZ	*	6634	UB0IBC	*	286
UA0QO	*	6240	UQ2GA	*	274
UZ0CWW	*	6160	UA9CR	*	216
UH8EA	*	4896	RL7GA	*	198
UB4XWB	*	3920	UA3XBB	*	176
UZ0LWG	*	3654	UP2OU	*	154
UA4RZ	*	3630	UI9BWI	*	96
UA0ZPB	*	2929	UD6CN	*	84
UZ1AWI	*	2496	UT5UGR	*	72
UA9NN	*	2200	UA6YCI	*	70
UB4IZZ	*	1980	RZ3AM	*	60
RR2RU	*	1980	UB5IFN	40	140
UQ1GWW	*	1800	UF6FAL	40	24
RL8PYL	*	1480	RW3AN	40	24
UZ3AXH	*	1254	UB5IJA	20	462
UI9AWX	*	1200	UA3TCJ	20	442
UH9EWA	*	1152	RA3VM	20	380
UA9LDF	*	1120	UA0LT	20	320
UA6AF	*	1071	UA4LBF	20	231
RT4UA	*	1002	UA6LFQ	20	196
UA4WBV	*	992	UW6OE	20	154
UP2BIM	*	972	UQ2GLW	20	96
UZ4WWB	*	952	UA9WYL	20	18
UA6LLT	*	912	UL7CEP	20	12
UA6LCJ	*	896	UV9WR	20	8
UW0CM	*	832	UB5VK	20	8
UB4CWW	*	650	UF6DA	20	2
UA9WEE	*	640	UL7TT	15	2
UW3UO	*	630			

We thank the following stations for their check logs. HA0HG, OH2EJ, OH3MC, PA3BTH, RA3VO, RT5UO. SM0BDS, SM6OOI, SP2GOW, SP3AOT, SP4JWR, SP6CIK, UA0ABB, UA0LCZ, UA0LDO, IA0ZC, UA0ZDE, UA4HLD, UA4NBH, UA6PCH, UA9AU, UH8ED, UL7BY, VK8NE, YO6LV.

PLEASE NOTE: * denotes worked all bands

Magazine Review

Roy Hartkopf VK3AOH
34 Toolangi Road, Alphington, Vic. 3087

G General *C* Constructional *P* Practical without detailed constructional information *T* Theoretical *N* Novice *X* Computer Program

CQ, June 1986 — VHF Special Issue. Classic Keys and Key Collections *(G)*. Using Packet Radio *(G)*.

RADIO COMMUNICATION, August 1986 — Cheap HB Power Supplies *(P : N)*. Frequency Synthesiser *(C)*. All Band Antenna *(P : N)*.

WORLDRADIO, July 1986 — General World Amateur News. Dayton Hamfest. Hazardous Materials. Packet Radio. *(G : N)*.

BREAK IN, June 1986 — Diamond Jubilee Conference.

QST, May 1986 — RF Measurement. Return Loss Bridge *(P)*.

HAM RADIO, April 1986 — Grounded Grid Amplifier Parasitics *(T : P)*. Satellite Communication *(G : T)*. AC Line Transient Protection *(P)*

HAM RADIO, June 1986 — Core Permenaility and Current in Windings *(T : G : X)*. Regulated Screen Grid Power Supply *(P)*.

ar

HEAT-SHRINK SLEEVE MARKING

A new system has been released for applying permanent marks to heat shrinkable sleeving using standard equipment.

The HSI system uses an irridated polyolefin which is flattened and then bonded to A4 size paper for marking by the user.

The paper is fed into a standard typewriter and marks can be typed as needed directly onto the sleeving, or alternatively marks can be scribed onto the sleeving with the use of a permanent marking pen. Once marked HSI is then cut, removed from the paper by hand and heat shrunk (2:1 ratio) on the cable in the usual way.

Nine widths of sleeves are available from 1.6 to 25.4 mm diameter. The layout of HSI on the sheet allows random selection of marks for rapid ease of use.

Adapted from *Electronics News*, p33 — April 1986

International News

FROM HOLLAND

The following is a report of a meeting between the Radio Communications Branch *of the Dutch PTT, the* VERON *(official amateur organisation),* VRZA *the second unofficial amateur organisation) and* NCV *(a splinter-group, but recognised by PTT, VERON and VRZA). It was published in* Electron, *June 1986 and translated for* Amateur Radio *by John Aarsse VK4QA.*

NCV announced that it is in liquidation and will not be represented anymore at the half-yearly PTT/ amateur meetings.

CEPT Licensing

CEPT is the European organisation of PTTs. The Dutch PTT announces that it will introduce simultaneously with the new Dutch licensing system a CEPT licence applicable to the Netherlands. It will be a publication announcing that amateurs from other CEPT countries with recognised licenses will be allowed to operate in the Netherlands for short periods without applying for a Dutch visitors licence. (Grade A, Grade B "full" licenses and Grade C (equal to VK limited licenses).

Dutch amateurs will receive a new registration card containing, in several European languages, a declaration indicating the appropriate licence the bearer has been issued with. This document will be valid in those countries who have adopted the CEPT licensing system.

50 MHz Operations

CEPT has discussed opening 50 MHz to amateurs. The UK is the only CEPT country permitting amateurs to use part of the 50 MHz band (with restrictions). France, Switzerland, Norway and Sweden are sympathetic to the amateur use of this band but will not allow it for the present. It is therefore expected that a solution will not be found before the year 2000. VERON asked if specific experiments could be conducted when the sunspot cycle was going up again. The Chairman said that the answer will not necessarily be "no."

Unmanned Stations

The new proposed licensing requirements will insist that unmanned stations will need a special licence.

Up until now repeaters needed separate and special licenses. The new proposals will allow such a station to be part of an individual station licence (private or club) and no separate request has to be made.

It will be necessary to identify such stations with a special prefix. The suffix can be issued, if possible, as the applicant prefers.

Such licenses will initially be valid for one year. Continuation of experiments is possible but will require a new application.

Before an application is considered, consultation will take place between the PTT and the two amateur organisations.

Following are tentative suggested prefixes.

Two metre repeaters	PI3
70 cm repeaters	PI2
Linear ATV repeaters	PI6
Beacons	PI7
Mailbox stations	PI8

Subsequent discussion results in PTT agreeing that all applications will be handled by the two organisations, a situation already in existence with regard to present repeaters.

PTT will not determine, in principle, power, etc of proposed stations. The two organisations decided to co-operate, within IARU 1 recommendations, to determine power antenna heights and antenna gain.

Regarding indentification, it will be allowed that an unmanned station will transmit no more than four times an hour the call sign followed by a possible traffic list (mailbox). It is not clear if this is the correct approach.

—Reprinted from *ELECTRON*, June 1986 and translated by John Aarsse VK4QA

INTERNATIONAL TRAVEL HOST EXCHANGE

Following is an additional list of amateurs who are participating in the International Travel Host Exchange Program. (See initial list page 43, August issue.

Belgium
Jean Fagnoul ON1KFN.

Canada
F H Prouse VE3PEJ, Carlton Sole VE3GHT, Bob Kane VE3KUG, Ross Carr VE6FG, Neil Smith VE6AZA, and William Giesbrecht VE7FRR.

Germany
Johannes Amchewicz DK8JB.

Greece
Agis Sarakinos SV1ACS.

India
M S D C Radharaman VU2RAD and G D Gopal VU2GDG.

United States of America
Dave McCurdy N1DLS, Mr and Mrs Garry Bartels KJ4KM and KB4TGC, Robert Blumberg AA4U, Mr and Mrs Richard Genaille W4UW, G E McGrede N5JDM, Mr and Mrs Ken Hopkins WA9WCP and KA9EFE, Mr and Mrs Karl Pruett WA0NPK, and Harvey Stadick KA0GBJ.

HIGHEST MEMBERSHIP IN JAPAN

Due to a membership promotion campaign in November and December, last year, the Japanese Amateur Radio League has, as of February 7, 1986, a total of 136 369 members, which is the highest in the history of the League.

—From *Region 3 News*, April 1986

BOTSWANA'S 20th INDEPENDENCE ANNIVERSARY

To celebrate Botswana's 20th Anniversary of Independence, the Botswana Radio Amateurs have been permitted to use the following Special Event Call Signs, during September and October 1986.

Full Licensees will use the prefix 8O2
Novice Licensees will use the prefix 8O0

BARS members, including SWLs and other Botswana active radio amateurs are being issued with QSL cards.

—Contributed by Gerold Tjarks A22TJ/802FTJ
Secretary BARS

FASTEST MOS CHIP!

A new silicon MOS chip, believed to be the fastest practical chip to date has been tested at speeds of up to three gigabits per second — fast enough to use in high speed fibre optic transmission systems.

This silicon chip shows that silicon can be used for gigabit-per-second logic circuits, and silicon offers higher yield, lower cost, and higher levels of integration than gallium arsenide.

Most importantly, the circuit consumes little power.

The multiplexer chip has 200 logic gates and dissipates only half a watt of power whilst the de-multiplexer ship has 400 logic gates and dissipates 0.75 watts. Both chips are 2 mm².

The chips were designed in 0.75-micron NMOS technology and feature channel lengths as small as 0.5 microns.

The multiplexer accepts 12 parallel input channels and, using time-division multiplexing, generates a multi-gigabit-per-second serial output. The de- multiplexer performs the reverse operation.

The propagation delay in each gate on the chips is only 150 pico- seconds.

Abridged from *Electronic News*, p4 — April 1986

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Terry and Gary (VK3ZHP)

ARB6/2

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Contests

Ian Hunt VK5QX
FEDERAL CONTEST MANAGER
Box 1234, GPO, Adelaide, SA. 5001

CONTEST CALENDAR

OCTOBER

4- 5	VK/ZL Oceania Phone Contest (Rules August issue)
4- 5	IRSA World Championship
11-12	VK/ZL Oceania CW Contest (Rules August issue)
-12	RSGB 21/28 MHz SSB Contest
15-17	YLRL Anniversary CW Party
-18	RSGB 21 MHz CW Contest
18-19	1986 Fall CW Contest (Rules August issue)
18-20	CARTG RTTY Contest
25-26	CQ WW DX Phone Contest
29-31	YLRL Anniversary SSB Party

NOVEMBER

- 8	Australian Ladies Amateur Radio Association Contest (Rules September issue)
8- 9	European RTTY Contest (Rules August issue)
—15	AHARS National CW Sprint (Rules this issue)
15-16	Oceania QRP CW Contest
—22	AHARS National Phone Sprint (Rules this issue)
29-30	CQ WW DX CW Contest

DECEMBER

—13	Ross Hull Memorial VHF Contest begins

JANUARY

— 5	Ross Hull Memorial VHF Contest concludes

VK NOVICE CONTEST 1986

Well, I wonder if there is any truth in the rumour that a niche is being built in the wall of a shack in the south-east of South Australia into which the Novice Contest Trophy can be cemented. It certainly appears that Don VK5NOD, intends to try something along those lines as he has emerged as the top scorer in the *VK Novice Contest* for the third consecutive year.

I guess that by his actions, Don is really throwing out a strong challenge to all to try and wrest the trophy from him. Our heartiest congratulations go to Don for his fine effort. To win the contest this year, Don increased his composite Phone/CW score by 304 points. This may have been helped by the fact that there were 87 entries in this contest an increase of 28 over last year's effort. This is rather pleasing.

There could be various reasons for the increased interest, however I feel that one major factor is the change of time of the contest to the month of June. Most comments point to the fact that it was a very enjoyable event.

Again there has been a fair amount of criticism at the lack of Novice stations operating using the CW-mode. The number of logs submitted for this section increased from four last year to 11 this year, which is certainly a marked improvement. I would like to see this rate of improvement maintained as I know that if more operators try the CW-mode in a contest they will find it rather enjoyable and not really difficult. Contest operation is nothing like *rag-chewing*, particularly where CW is concerned. So, I suggest that you try it for yourself and find out just what I really mean. You may also care to review the comments included with the results of the 1985 VK Novice Contest dealing with this same subject. I have received little feedback from them.

Mention must be made of the fine effort put in by VK4VAT in running a close second in the overall points and a special mention is warranted for VK2PYM, who came second in the CW section in his first contest ever, certainly something to be proud of. Perhaps we might see the VK2PYM call sign way up in the CW sections of other contests in the future.

In general, logs were of a good standard, however, some operators left it to me to score their logs for them. It was also not apparent to some that a separate log was necessary where both phone and CW entries were made.

On the subject of logs, I would like to draw attention to the efforts of Len VK3NLS. I know that Len will not mind me telling this story now, well after the event. Several years ago, I entered into some correspondence with Len due to the fact that his log for a particular contest was definitely not acceptable. Well, I can certainly tell you that in this contest, as well as others, he has submitted a log which cannot be faulted in any way. As well, he has provided additional help by including complete sorting of the log in order of call signs, etc. Yes, Len's log was computer generated but, as I said before, it was immaculate. I suggest that if you want to find out how to make an excellent log, VK3NLS is the person to approach for advice.

Individual scores for the 1986 VK Novice Contest are as follows:

PHONE/NOVICE

VK5NOD	971	VK2NNK	499
VK4VAT	815	VK5KCX	331
VK7NCP	778	VK2JAM	299
VK2NAN	768	VK2PYM	227
VK3NLS	730	VK6NTJ	221
VK7NAI	596	VK3PJP	204
VK2NXA	594	VK6NSH	194
VK3KRL	557	VK3NBN	133
VK3VAS	504	VK7NBF	107
VK5NTT	502	VK3VOJ	83

CW/NOVICE

VK4VAT	135	VK8NBC	37
VK2PYM	127	VK3VAS	12
VK2JAM	110	VK5NTT	10
VK3NLS	76	VK3KRL	10
VK5NOD	72	VK6NTJ	4
VK7NBF	59		

PHONE/FULL CALL

VK3EW	1498	VK3CLS	209
VK5SJ	1343	VK6QS	170
VK2CXX	700	VK2DQP	168
VK5QX	620	VK3ZI	146
VK5ATU	591	VK6AFW	122
VK3DOM	582	VK3CGG	113
VK3YH	530	VK3XF	109
VK2AKP	504	VK5AGX	69
VK4OD	419	VK3DBQ	65
VK3BJN	395	VK6ED	64
VK2BQS	311	VK1RH	57
VK1LF	297	VK3KS	20
VK2RJ	247	VK3XB	15
VK2SA	213	VK5GZ/8	39

CW/FULL CALL

VK3CGG	249	VK6AFW	64
VK3NK	155	VK4TT	49
VK2PS	139	VK3XB	46
VK4OD	113	VK5QX	34
VK2DQP	94	VK3XF	27
VK4AOR	90	VK3KS	22
VK5AGX	88	VK2CXX	21
VK3CMZ	80	VK6QS	18
VK2AZR	78	VK5ATU	2
VK2RJ	72	VK5GZ/8	2
VK4BRZ	70		

PHONE/CLUB

VK3IE	949	VK3SCD	314
VK2IYP	377	VK4BPA	284

SWL

L20282	751	L30371	87

CW/CLUB

VK3IE	140

CHECK LOGS

VK2JGR	VK2LE/P
VK4BA	

Incidentally, an interesting aspect regarding this contest has surfaced. A telephone call from Don VK5NOD, provided the information that the VK Novice Contest Trophy, which is in the form of a plaque, has the call signs of each winner engraved on it against the year in which the trophy was won by that operator. Don pointed out that in each case the "year" shown on the trophy is incorrect. I have asked him to forward the trophy to me so that I can look into this matter. It does seem as if it may be necessary to have the trophy re-worked with the engraved section replaced with the correct information.

I would like to express my thanks to all the contestants who entered this years contest and thus helped to make it a much greater success than in the past. I would also suggest that, as it is our annual "Novice" contest, it should be provided with much more support by our Novice operators in the future.

Some of the comments provided with logs submitted this year are as follows:

"Most activity I've heard on any VK contest except RD. Very friendly — almost everybody was happy to stop for a chat . . ."—VK3CRA operating VK3SCD/P

"Do not agree with VK7NBF's remarks re overcrowding in the novice CW segment. The novice CW 3.525-3.535 segment is NEVER overcrowded. There is always room for *at least 10* more novices than I ever hear at any one time."—VK3XB

"Entry submitted in appreciation of your efforts over the last few years, will be again interesting to see if the novices appreciate your efforts, but I doubt not — my log speaks for itself."—VK4BRZ

"I was a little bit disappointed in the lack of contacts with novice operators, I manned the station for as long as practicable, having regard to my age (70 years), I also noted that most operators with AOCP privileges used full power, perhaps overshadowing the novice operator. I maintained 10 words per minute and regret to say that some replies were well in excess of the speed set down in the rules."—VK3CMZ

"Good contest. More stations on than last year. 15 metres very poor. 10 metres nil heard."—VK1LF

"Usual sporadic operation as is my norm these days. There seemed to be more novices again this year, especially "N" series . . . the stint on Saturday night was on the FT7 in the study . . . I will say the study has advantages this time of year — about 15 degrees Celsius advantage."—VK2BQS

"This was the first time I have been on the air and I thank you for providing the necessary incentive to make that first call."—VK3VOJ

"Some full call operators complaining about how they held certain frequencies for the duration of the contest, even when channel clear for three minutes, many complaints about my loud signal, suggest they learn about antenna building, and move to a big hill!"—VK5KCX (What about an antenna article for AR, OM —Ed)

"Contestants should be encouraged to use the phonetic alphabet at all times . . . the practice of stations using non-standard phonetics (A: America, L: London, Z: Zanzibar, etc) is not only annoying it could also lead to errors in call signs in less than optimal operating conditions. It should be strongly discouraged."—L20282 (You may well have a good point there Greg. The phonetic alphabet accepted for use these days has been specially planned to obviate errors in understanding —FCM)

"I found the contest, at times I was able to operate in it, most enjoyable and very friendly."—VK4CE/VK4BA

"I enjoyed operating in this years comp, everyone seemed to enjoy themselves. Thank you for your time and trouble, Ian."—VK3YH

"This year I enjoyed it more than last year and found that the majority took heed of your requests regarding speed and power used. Unfortunately, I was called by the Police Rescue Section to participate in a marine emergency in Bass Strait (on 27 MHz) losing a couple of hours on Saturday night. When I got back, 3.525 to 3.535 MHz was occupied by a couple of broadcast stations of oriental origin. On Sunday afternoon, the same frequencies were occupied by two pairs of Japanese fishing boats. Life was not meant to be easy. Hi. Thank you for organising the contest."—VK7NBF (Sounds like you might have an interesting story to tell about emergency operation, Bob. How about writing something for *Amateur Radio* magazine? Also, you could consider putting in reports of intruders to your IW Co-ordinator. I am sure he would appreciate them. —FCM)

"Best thing ever done — put this contest on at this time of the year — no QRN. I was asked twice how does one score for K and J calls — I advised to treat as novice calls which I think is correct. Perhaps this point should be put in future rules. Propagation was no good on 10 and 15. Where were all the VK1s — after the RD contest they must have retired? !"—VK4OD

"I was amused by some of the excuses I was given by phone operators for CW contacts. For example — no key; key plug behind rig; no CW filter; no practice (but will be); only one log sheet used for phone only. Not one gave the real excuse which I would have accepted, or maybe the best excuse was that they were too busy, but I was not calling phone at busy times."—VK3CGG

". . .rather a restricted one in regard to time restraints due to shift work requirements, plus a lot of QRN/QRM,

especially on 80 — lots of broadcast stations blocking out everyone ... However, better luck next year I guess."—VK8NBC

"The 80 metre band from Darwin has been better on other nights. Power line noise bad for contest. We hear a lot more rubbish than amateurs on this band than what I hear in VK5. All the novices on 15 metres were not really in the contest, at least I made an effort, Ian."—VK5GZ/8

"On what was only my 12th contact since becoming licensed a CQ from VK3KLE, I heard about the contest and he kindly took the trouble to explain the workings to me. And lo, another 34 contacts that I enjoyed and from a good deal of the country. And much learned. Spoiled a bit by full call stations occupying most of the band and taking advantage of their extra power but I think it has been worse in the past and perhaps new rules have improved the situation. My first experience. Much enjoyed."—VK3NBN

"We attach the log of the St George Amateur Radio Society for the activation of the Society's call sign VK2LE/P ... You will undoubtedly receive the log of the other Society call sign VK2IYP in the near future ... The contest appeared to be an amazing success and enjoyed by all who participated. We were glad to have been able to activate the two St George Amateur Radio Society call signs for the contest."—VK2AXS

NATIONAL CW AND PHONE SPRINTS

This month we announce a new and innovative approach to the subject of on-air competition. This is the implementation of two very short "sprints" or "scrambles", one for phone and one for CW to be held in November.

As Federal Contest Manager I have expressed strongly my opinion in the past regarding the fact that there are too many contests run on our bands. Further, there has been a large body of opinion to the effect that contests should be fairly tightly restricted as far as frequencies are concerned. In this instance, the approach adopted by the Adelaide Hills Amateur Radio Society Incorporated, has quite a deal to commend it.

I present the rules for these events at the same time pointing out to you quite clearly that these competitions are not organised by me as Federal Contest Manager. I am simply providing some publicity for them.

The Sprints are a suggested annual event, however if sufficient interest is shown, consideration could be given to running these short competitions on a more frequent basis. You could let me know what you think of this idea which is certainly a new approach to competition on a national basis in amateur radio in Australia.

I have often entered Scrambles at various conventions and have always found them to be good fun. It seems to me that the rules adopted ensure that there is a frequency restriction applied, (one band only), as well as a time restriction. (One-and-a-half-hours duration). As such, there is a very good possibility that the idea will appeal to many of you who would not otherwise enter into contests at any time. Full details are provided below.

REMEMBRANCE DAY CONTEST

This material is being compiled just one week before the Remembrance Day Contest. I am looking forward to entering same and hope that I will be able to exchange serial numbers with many of you. It will be rather interesting to see just how long it is going to take for the Weighting Factors to change due to Divisional Activity to a degree where they will produce a change in the results. Maybe even this year we will see one of the Divisions make some kind of an effort to improve their score and bring about yet another change. Personally, I am not completely happy with the current approach as I mentioned in my report to the 1986 Federal Convention. I believe now that only a lengthy time period will indicate the true effects of the current system. No doubt, you will have read the comprehensive article written by Ron VK1RH, on the subject of Remembrance Day Contest Scoring and perhaps studied the graphs of activity over the years. I would like to express my personal thanks to Ron for his efforts and also for undertaking the calculations needed to determine the weighting factors to be applied to the Divisional scores. I hope that we will all have had a most enjoyable time operating in this years Remembrance Day Contest. By the time you read this I will no doubt be inundated with all the logs that have come in.

ROSS HULL CONTEST

Next month, I will be providing details of the rules for the Ross Hull Memorial VHF Contest. Again, quite a few changes have been made in an attempt to even out the competition and provide a more universal appeal.

Depending on the results, a decision will most definitely be due as to just what will need to be done about this contest. Up until now I have not received much in the way of feedback from the Discussion Paper, which was circulated to each of the Divisions in May. So far, only two Divisions have provided anything in the way of comment. Now, I wonder whether there is really any interest at all in this contest. Sometimes, I am inclined to think that I am perhaps just being ignored. It is a lonely feeling at times although I can console myself with the thought that if I don't hear from anyone it is not really due to apathy but rather that I must be getting things right and thus I am left alone. I wonder what the true story really is? ? ?

VK/ZL CONTEST

I expect that you have noted the different approach to the time period for the VK/ZL Contest in the rules provided by Jock White ZL2GX, this year. In discussion with Jock on one of our regular scheds, he informs me that the basic idea is to make the contest more attractive for those who cannot spare the full 24 hours for operation and also to encourage more activity. There will certainly be some strategic advantage in knowing just when which band is likely to be open. Yet again, we may see some changes from the usual pattern of the same stations coming up with the top scores year after year. Or will we?

GENERAL CONTEST INFORMATION

From time-to-time I am asked by individual operators for basic information as to how one goes about entering into contests. I also receive suggestions along the lines of running a separate section in the notes for beginners.

There is some merit in such things, however, it is also necessary to explain a little with regard to the production of these notes and the limitations brought about by the nature of our magazine. Some of the problem comes about due to the lack of time available to me to sit down and write up separate material for this column. I have to try and keep up to date in the matter of contests and information which needs to be disseminated as currently as possible. Next is the fact that not a lot is to be gained in going over old ground. There will always be newcomers to the scene, and I am as keen as anyone else to encourage them in their activities. Most operators who are interested in trying out in the contest arena will be able to find some friendly operator to either explain in person or over the air, just how to go about starting in this type of activity. Then again, it is possible that they can gain more information by looking back over old issues of *Amateur Radio.*

When I became Federal Contest Manager a few years ago, I did go to the trouble of producing a series of articles as part of these notes. These articles covered a wide range of topics such as: setting up your station; operating in field day contests; preparing logs and check sheets (including examples); planning your operating and tactics as well as providing general hints designed to help in making your contest operations more enjoyable.

Maybe you could review these articles if you are unsure as to what you need to do in entering contests. (It also occurs to me that I could polish them up just a little and ask the editor if he would be prepared to reprint them as a series on contesting. To do this however, I will need to find some time over and above what I have available at the moment).

Still, I do hope that I am making a useful contribution to the hobby and I still welcome any suggestions which you may have to help improve this column and its presentation. Meantime, while I try and do something about these matters, you may try and find those back issues. Look for them from about the August 1984 issue, onwards.

Meantime, I again wish you all the best in your activities and trust that you will enjoy the various events coming up in the future.

—73 de Ian VK5QX

NATIONAL CW AND PHONE SPRINTS

The Adelaide Hills Amateur Radio Society Inc, is delighted to announce the inaugural National Sprints, a pair of "quickie" contests for CW and phone operators, to be held during November 1986. The National Sprints will be similar in nature to local scrambles, but nation-wide participation makes them something new in Australian contesting. The National Sprints are endorsed and supported by the South Australian Division of the Wireless Institute of Australia, which will provide certificates and trophies.

The reasoning behind the National Sprints is this — there are too many "big" contests each year; they require a lot of time and the rules are complex, thus discouraging many operators from participating. The National Sprints are short, sharp and simple, requiring a minimum of time while providing a significant operating challenge.

Object of the Sprints

The operator's basic goal in the Sprints is to make as many contacts as possible (without duplication) during an hour and a half of operation on a single band. Any contact on 80 metres during the Contest Period including DX, can be counted, but a station may only be claimed once.

Eligibility

The National Sprints are open to any licensed amateur or group of amateurs using a single call sign; eg club stations, anywhere in Australia (VK call areas).

Contest Period

1200-1330 UTC November 15, 1986 (CW Only)
1200-1330 UTC November 22, 1986 (Any legal phone mode)

Frequencies

For the CW Sprint, frequencies between 3.500 and 3.700 MHz may be used.
For the Phone Sprint, frequencies between 3.535 and 3.700 MHz may be used.

Regulations

Irrespective of any provision contained in these rules, operators are reminded that they must operate in accordance with the terms and conditions of their respective licenses and applicable regulations.

CONTEST CALLS

CQ Sprint or CQ Test or CQ Contest.

EXCHANGES

Minimum exchange for a valid contact will consist of signal report and a three digit serial number. The serial number may start at any number between 001 and 999, but will revert to 001 if 999 has been reached.

Logs

Contest logs must show for each contact the time (UTC), call sign of station worked, report/serial number given and report/serial number received. Each log must be accompanied by a cover sheet showing the date and name of the Sprint (CW or Phone), the total number of contacts claimed, and a statement that the operator has abided by the rules of the contest, signed by the operator/s. Any special conditions such as QRP or mobile operation should be mentioned in the statement.

Logs are to be in the hands of the Society no later than Friday, December 5, 1986 and can be addressed to:
National Sprint Manager, c/- AHARS, PO Box 401, Blackwood, SA. 5051.

Awards

Certificates will be awarded to the highest scorer in each Australian call area for both the CW and the Phone Sprints. Trophies will be awarded to the outright winner of each Sprint.

Certificates may be awarded to other operators whose performance was, in the opinion of the organisers, exemplary.

Any entry which is patently in violation of the rules or spirit of the Sprints, or which contains an excessive number of claimed duplicate contacts (this does not refer to duplicates which have been indicated as such and are not claimed), may be disqualified.

The decision of the Society' in respect of the interpretation of these rules, granting of awards, or disqualification will be final.

COMMONWEALTH CONTEST 1986

According to some of the pundits, Cycle 21 has finished and we are again on the way up. The number of VK entrants in this contest seems to be very much tied in with conditions, the members in the last three years 84-66; 85-58 and bottoming

this year at 52, (but still a very respectable total), the turn-up must have taken place sometime after the second weekend in March! Few VKs would have labelled the conditions during the contest as even 'fair.'

However, though the outright winner scored only 250 odd points more than the year before, Russ Coleston VK4XA, improved his position from eighth to fifth, and scored 630 points more than in 1985. As will be seen from the table below, only 150 points separated the top three, 6Y5HN, making the highest number of QSOs, 471; VE3BVD 416; VE6OU/3 400; while Russ made 276. In the race for bonuses, VE7CC was top at 155, G3FXB 141, and Russ 133.

Though not so many ZLs seemed to be operating as in 1985, there were at least a few — it was disappointing that only three of them appear in the results.

In the Receiving Section, Eric Trebilcock made it four in a row winning by 105 points over his old adversary, BRS 1066.

TOP TEN

1. VE3BVD	4550	6. G3FXB	3945
2. 6Y5HN	4414	7. G3PEK	3555
3. VE7CC	4400	8. VK2BQQ	3517
4. VE6OU/3	4139	9. G3MXJ	3468
5. VK4XA	3991	10. ZL1AIZ	3462

RECEIVING SECTION
1. Eric Trebilcock BCRS 195 2200

AUSTRALIAN SCORES

5. VK4XA	3991	60. VK2EL	1342
8. VK2BQQ	3517	64. VK3KS	1275
11. VK2AYD	3460	66. VK4BSQ	1265
13. VK3MR	3302	67. VK8HA	1250
14. VK6LW	3295	69. VK7RY	1204
21. VK7BC	2895	71. VK2SU	1162
23. VK3AUQ	2680	74. VK4TT	1115
26. VK4APZ	2585	79. VK6AJ	1040
27. VK3DQ	2517	80. VK3DOV	1036
28. VK6IT	2509	82. VK5BS	987
29. VK2ZC	2501	89. VK3XB	792
30. VK5AGX	2474	90. VK3RJ	785
31. VK2AQF	2412	91. VK6ED	770
32. VK5BN	2351	92. VK2AZR	758
33. VK5UM	2350	93. VK5RG	749
33. VK6HQ	2350	94. VK4BKM	745
36. VK4XW	2302	95. VK3XF	732
40. VK2BAT	2025	96. VK6AUX	724
44. VK3BDH	1892	98. VK4SF	665
45. VK2DID	1860	99. VK7ZO	640
47. VK5GZ	1735	102. VK3FC	582.
49. VK2APK	1727	104. VK6RZ	560
50. VK3MJ	1687	106. VK2GT	550
51. VK3ZC	1685	121. VK4RAN	235
55. VK7CH	1535	121. VK4NUN	235
57. VK6RU	1464	124. VK2HC	202

Single-band entries among the above were:
3.5 MHz VK3XB Overseas Leader, VK4NUN
7 MHz VK2APK Overseas Leader, VK3FC, VK6RZ
14 MHz VK3KS Overseas Leader, VK3RJ, VK4BKM, VK4RAN, VK4TT, VK6AJ, VK8HA

Congratulations to Ivor and Mavis Stafford who took out two of the single-band awards using their joint station — apparently Ivor on the air while Mavis was in the kitchen!

PACIFIC AREA SCORES

10. ZL1AIZ	3462	38. ZL1HV	2134
15. P29PR	3287	48. ZL2TX	1730
17. T30AT	3187	81. P29FJ	990
22. 9V1TL	2775		

VK TEAM EVENT AND AWARDS
New South Wales comfortably retained the four man team title, defeating VK3 by 1500 points, with VK4 third.

Comparative totals for the past five years are as below. The UK, had they been in the competition, would have won, hands down, four years out of five.

	1986	1985	1984	1983	1982
VK2	11890	10632	16272	10467	13450
VK3	10391	8784	14549	13062	15813
VK4	10143	8359	12475		
VK6	9618	6482	10303	6776	9748
VK5	8910	8761	8965	6822	7760
VK7	6274	7982	7571	5199	9865
G	14408	13193	17064	10872	20384

AWARDS
The Gold Medallion for the leading VK entrant was won by ***Russ Coleston VK4XA.***

The Silver Medallions for the leading State Team were won by ***K Nad VK2BQQ, D Pilley VK2AYD, Jim Cowan VK2ZC*** and ***E Carruthers VK2AQF.***

HOW THE LEADERS MADE THEIR SCORES
QSOs/Bonuses per band 80-10 (claimed).

VE3BVD	59/23	114/51	223/35	20/20	
6Y5HN	37/15	144/38	223/35	22/12	1/1
VE7CC	37/29	86/45	102/52	44/29	
VE6OU/3	23/17	119/43	237/32	21/21	
VK4XA	34/19	67/36	120/40	46/29	9/9

The adjudicator, Alan Gray G4DJX, has produced, through his computer, a very interesting series of tables covering the results in each of the main geographical areas of the Commonwealth. Of course, these are only in respect of those who submitted logs, so the overall totals would in fact be greater — 13405 QSOs were made in the 24 hours, 7103 bonus areas worked, 31 unmarked duplicates were noted (22 of them on 14 MHz) and a total of 204 020 points were credited. Our 52 entrants were the most from any one country, but the Gs are creeping up, to 46.

The table below shows the number of suffixes per call area per band, worked by stations outside the UK. By next year we will have a similar table showing the same information as worked from VK.

In the rare area class were ZL4 (!) worked by one VK, and VE2, VK1 and ZB2 worked by two VKs.

CALL AREAS WORKED FROM OVERSEAS

	BANDS					
AREA	3.5	7	14	21	28	TOTAL
A2		1				1
A3	1	1	1	1		4
G	67	175	340	150	3	735
P2	1	2	3	2	1	9
T30	1	1	1	1	1	5
VE1	8	13	14	6		41
VE2	3	3	7	2		15
VE3	13	36	39	16		104
VE4		3	5	1		9
VE5	4	5	5	2		16
VE6	1	2	5			8
VE7	2	9	13	7		31
VE8		1	1			2
VK1	1	1				2
VK2	9	18	22	16	4	69
VK3	15	23	23	11	4	76
VK4	8	9	11	6	1	35
VK5	6	11	12	5	2	36
VK6	6	12	12	10		40
VK7	6	7	6	5	1	25
VK8			2			2
VK9N		1				1
VO1	4	5	3	2		14
VP2M	1	1	1	1		4
VQ9	1	1	1	2		5
VS6			3	2	1	6
VU		6	9	1		16
Z2		2	1	1		4
ZB2	1	1	1	1		4
ZC4		3	3	1	1	8
ZD8			1			1
ZL0		1	1			2
ZL1	6	14	10	8	3	41
ZL2	3	6	9	4	1	23
ZL3	1	1	1	1	1	5
ZL4		3	1		1	5
3D2		1	1	1		3
3D6	1	1	1	1		4
5H		1	2	1	1	5
5N		1	2	2	1	6
6Y	1	2	2	1	1	7
8P		1				1
8R		1				1
9H		1	1			2
9J	1	1	2	1	1	6
9V	1	1	1	2	1	6
AREAs	28	43	41	34	19	
SFXs	173	389	579	274	30	

A total of 46 Call areas were worked.

RSGB COMMENTS
If you are looking for a contest to enjoy, work DX, and make many friends, then this is the one. It could also be a very profitable one if you are to believe the rules as published in the Australian magazine *Amateur Radio* which stated that "each completed contact will score five pints." ! ! ! As Kev Phillips VK3AUQ put it — "the rules say I can claim five pints per contact, so I should claim for 745 pints or 93 gallons and one pint." Well Kev, I've heard that Aussies are big drinkers but could you really cope with that amount of alcohol? ? ?

There were 126 entrants who made a total of 13405 QSOs including 67 on 28 MHz — an improvement on last year. Although conditions were slightly better many stations still struggled to make contacts; the thrill and excitement seems to lie in the challenge to dig out those call areas from the noise and QRM. Perhaps it is the gentlemanly (apologies to the YL operators) operating with many stations using the contest to keep in touch with old friends, which makes it so much fun. Even though there are many OTs — some in their 80s — who regularly participate, it is by no means an old mans' contest with many youngsters on the scene making a challenge for the honours; eg, VK6LW, G4BUO.

This years winner is David Dudley VE3BVD, who made an impressive 4550 points from 416 QSOs and receives the Senior Rose Bowl. David used a TS830S, plus an MLA 2500 feeding 80 metre phased verticals, 40 metres three element, two element Yagi, 20 metres six element, four element Yagi and 15 metres five element, five element Yagi.

Second for the second year running is Nigel Hoyow 6Y5HN, who made 4414 points from 471 QSOs using a TS180S plus SB201 feeding 40/80 metre trap inverted Vee dipoles at 30 feet (9 m) and a four element beam at 33 feet (10 m). Last years winner, Lee Sawkins VE7CC, came a very close third at 4400 points from 268 QSOs using a TS820S plus LB4 feeding an 80 metre sloper array, 40 metre two element Yagi at 100 feet (30 m), 20 metre five element Yagi at 105 feet (31 m), and 15 metres four element Yagi at 90 feet (27 m). Al Slater G3FXB, returns as the number-one UK entrant winning the Col Thomas Rose Bowl with 3945 points from 235 QSOs and used a T4XC/R4C combination with 80 metre slopers, three element and two element Yagis and quad loop on 40 metres and a 20/15 metre quad.

Eric Trebilcock wins the Receiving Rose Bowl in his 46th Entry. Mention should also be made of the efforts of Russ Coleston VK4XA, who leads the Australian entry for the seventh year in succession.

Congratulations to all the trophy winners, and to all who received certificates.

The Australians had an impressive turn out, the only disappointment being the lack of VK1 activity. VK8HA, despite his other commitments, managed to provide many with a sought after call area.

T30AT was a welcome sight to most but was not heard here in the UK, but the UK does hold the advantage when it comes to working Africa.

In all some 53 call areas were worked — again an increase on last year. There were reasonable 20 metre openings from the UK to Oceania at the start of the contest with Canada and Africa appearing later. The 15 metre band was in good condition to Africa on both days but was very poor to other areas. For a very limited period 10 metres was open.

Only two entrants from the UK made a contact with 9J2BO who was 559 at 1444 UTC. There was little HF activity during the night. The 40 metre band was fair, being open to all of Oceania, with Al Slater contacting 28 call areas — obviously those beams work! But 80 metres was disappointing and only Barry G3PEK made any real impression with his vertical and extensive radial system. ZL3GQ was particularly loud on any band! Once again it is those stations who have a good knowledge of band conditions who can make the most out of this contest. Unfortunately for the VK contingent, storms off two coasts produced high noise levels which made reception difficult especially on the LF bands which could be why modest set ups failed to produce results this year.

With the *Golden Anniversary* next year, the RSGB are making some special arrangements to celebrate one of the oldest radio contests in the world. Full rules, with details of the arrangements will be published later.

Make a date in your diary now for the second full weekend in March next year — something not to be missed! !

Many thanks to the following stations who sent in check logs:

G3CXM, G3GMM/A, GW3JI, G3OZF, G3WP, G6NK and VK3KF. Special thanks to John Tutton VK3ZC, for his invaluable help in promoting the event "down under." —G4DJX.

—Contributed by John Tutton VK3ZC
ar

FIRST IRSA WORLD RADIO CHAMPIONSHIP

Phone: Saturday, October 4, 1986, 0000 to 2400 UTC.
CW: Sunday, October 5, 1986, 0000 to 2400 UTC.

Single operator stations may operate no more than 22 hours out of the 24 hours on each mode. A minimum of two hours rest time may be taken in one or two rest periods. All multi-operator stations can operate for the full 24 hours.

Objectives: For amateurs around the world to contact other amateurs in as many countries as possible. All contacts with fixed or mobile licensed amateur radio stations around the world, including own country, count.

Bands: 1.8, 3.5, 7, 14, 21, 28 MHz.

Number Exchange: Signal report plus the consecutive QSO number starting with 001. (59001 phone and 599001 CW).

Points: Each correctly sent exchange is worth one point, each correctly received exchange is worth one point on phone and two points on CW: a total of two (three on CW) points for each error free contact. The same station can be contacted only once on each band and mode for a valid point credit. Contacts with own country count also.

Multipliers: On each band a multiplier of one for each different DXCC country contacted, plus one for each call area in the following countries: Australia VK1-8; Brazil PY1-8; Canada VE1-8, VO1, VO2, VY1; Japan JA1-0; European RSFSR — USSR UA1, 3, 4, 6; Asian RSFSR — USSR UA9, 0; USA W/K/N etc 0-9. (Do not count VK1 as a VK — country too). Also, a multiplier of one each for the land, maritime and aeronautical mobile group /M, /MM. /AM. Stations, except mobiles, operating from another call area must sign their call with a slash and a number of the area; eg K4VX/0, W0AIH/9, etc.

Scoring: The final score is the result of the total QSO points from all bands multiplied by the total multipliers from all bands.

Categories:

H. High Power — stations using the maximum legal limit up to 1000 watts output, (2000 watts PEP).

L. Low Power — stations using the maximum output power of 100 watts (200 watts PEP).

Q. QRP — stations using the maximum output of five watts (10 watts PEP).

In each of the above power groups there are the following categories:

A. Single Operator — All Band.
B. Single Operator — Single Bands: 160, 80, 40, 20, 15, 10 metres.
C. Multi Operator — Single Transmitter.
D. Multi Operator — Multi Transmitter.
E. Club Competition — Combined.

Combined Phone and CW scores will be used for the main competition category. Phone and CW results will also be listed and awards issued.

Category A and B can be operated by a single operator, without any other assistance from other operators, repeater nets or bulletin boards.

Category C and D includes club stations, stations operated by more than one operator and single operator stations using repeater, spotting nets or any other assistance when operating.

Single transmitter category stations may use only one transmitter which is connected to the power source during the contest. In case of failure, it may be replaced by another transmitter. Spotting operators may use receivers or transceivers with transmitter disabled only.

The multi transmitter category stations may operate one transmitter per band simultaneously. All transmitters must be located within a 500 metre diameter or within the property limits of the station licensees address. The antennas must be physically connected by wires to the transmitter.

Category E — Club competition entries may claim a maximum of one station per category, in a selected power group, on each mode (maximum 18 — nine on phone and nine on CW). The final club score is the addition of individual highest scores made by the club members on both mode Expeditioners and mobile operations by the club members can also be counted. The club official must submit a list of stations, their category and scores. Each power group will be judged separately.

Awards: there will be awards of certificates, trophies and plaques.

Log Instructions: All dates/times must be in UTC. All the sent and received exchanges must be logged. A multiplier should be indicated only the first time it is worked on each band. Logs must be checked for duplicate contacts, correct QSO points and multipliers. Do not use separate sheets for each band, except for multi operator, multi transmitter stations who should keep separate logs and numbering per band. Single operator stations must clearly mark the rest periods in the log and should indicate the total operating time on the summary sheet. A sample contest form kit is available from IRSA for a SAE and US$1 or 3 IRCs.

All participants are encouraged to send the log in regardless of their score. They are needed for checking purposes.

A one year subscription to *Radiosporting* magazine will be awarded to the 10 stations selected by a draw from the logs received.

Deadline: Logs must be mailed not later than 30 days after the contest and be in the hands of the IRSA WRC Contest Committee by December 31, 1986. Logs to: IRSA WRC Contest Chairman, W3FG, PO Box 7, Odenton, MD, 21113-0007, USA. **ar**

Intruder Watch

Bill Martin VK2COP
FEDERAL INTRUDER WATCH CO-ORDINATOR
33 Somerville Road, Hornsby Heights, NSW. 2077

Ulrich DJ9KR, the DARC National Bandwacht (Intruder Watch) Co-ordinator, reports that the net of the "Ministry of Foreign Affairs," in Islamabad, has, as a result of complaints, QSYed from around 14.345 MHz to 14.385 MHz. They should no longer be a problem to amateurs active on the top end of 20 metres. I have no evidence of interference in VK from the net, but it is nice to know that intruder watchers around the world are keeping an eye on things.

INTERFERENCE BECOMING RIFE

Moving a little south-east, a letter from Bernd DL7MV, of Bandung, Indonesia, gives us the following:

Bernd is the ITU senior training expert, RF Monitoring Branch, in his area, and tells me that he is interested in trying to help the Intruder Watch with the problem of the alleged Indonesian interference which is becoming rife on 28 MHz. I hope to be able to tell you more on this later.

HELPERS FOR THE MONTH

More good help in June 1986, from VK2s DVW, PS, QL, Mr G H A Bradford, VK3s AMD, CGG, VK4s AKX, BG, BHJ, BN, BTW, DA, KHZ, VK5s BJF, GZ, VK6s JQ, OD, RO, XV, VK7RH, VK8s HA and JF.

There were 278 cases of broadcasting interference reported, 141 in the CW mode, 69 RTTY pests, 38 other modes and 38 stations identified. The VI prefix is authorised for use in South Australia until December 31, so don't suspect piracy if you hear someone using this prefix.

OH! SO ENVIOUS

Often, as I write this column, I think of and envy those who write DX news columns — while they, on one hand, can pass on the good news of who are about on the bands for the chasing, I have, unfortunately, only news to pass on of those who ***shouldn't*** be on the bands. One of these days I will indulge in a fantasy, and report that "no intruders were heard for the previous month! ! !

USSR SHIPPING

Some interesting information to hand, courtesy of Colin VK2PLV, who saw it in *Popular Communications,* October 1984. The article was written by Harry Caul KIL9XL, and deals with signals to and from USSR shipping.

Harry says, "Vessels belonging to the Soviet Merchant Marine, have radio call signs which are generally four-letter types, commencing at the letter **U** or some other prefix assigned to the USSR. Typical examples would include:

"ESXC (cargo vessel Magnit); UQIR (freighter Labinski; and ERUQ (freighter Gueograf). These call signs are shown in international merchant marine communications registries for commercial purposes. The radio call signs of fleet vessels of the Soviet Navy, of course, would not appear in the registries" . . . and . . . "for CW operations, vessels communicating with the **U** prefixed shore stations will most likely be using frequencies within the same band as the shore station, first establishing contact on a calling frequency and then switching to a mutually agreed-upon working channel." An extensive list of call signs accompanies the article and the infamous "UMS" appears, being listed as operating from Moscow.

So we learn a little more each day. As I close the column for this month, I point out that by far the greatest number of intrusions into our bands are by stations whose call signs begin with the letter "U"! Hmmm. See you next month, and take care.

WILLIS AIR-WOUND INDUCTANCES

Tinned Copper Wire on Polystyrene Supports

TYPE	DIAM	LENGTH	TPI	IND uH	SWG	PRICE
1-08	½"	3"	8	2.00	19	$2.12
1-16	½"	3"	16	5.50	21	$2.12
2-08	⅝"	3"	8	2.70	19	$2 50
2-16	⅝"	3"	16	8.00	21	$2.50
3-08	¾"	3"	8	2.90	19	$3.05
3-16	¾"	3"	16	10.90	21	$3.05
4-08	1"	3"	8	4.80	19	$3.38
4-16	1"	3"	16	19.90	21	$3.38
5-08	1¼"	4"	8	9.40	18	$3.74
5-16	1¼"	4"	16	37.50	21	$3.74
8-04/4	2"	4"	8	—	18	$5.45
8-10/4	2"	4"	10	32.25	18	$5.45
8-12/4	2"	4"	12	—	19	$5 95
8-16/4	2"	4"	16	83.50	19	$5.95
8-08/7	2"	7"	8	—	18	$9.45
8-10/7	2"	7"	10	60.80	18	$9.45
8-12/7	2"	7"	12	—	19	$9.95
8-16/7	2"	7"	16	157.75	19	$9 95

WILLIS Air-Wound Inductances are a high quality product manufactured to the requirements of professionals in the electronic field.

The coils listed above are classed as *'Bulk Inductance'* and are intended to be pruned for individual requirements. Complete coils can be used of course, if the total inductance is the value required.

The inductance values shown are approximate allowing for any variations in wire gauge and other small manufacturing variables.

Take the hard work out of Coil Winding — use "WILLIS" AIR- WOUND INDUCTANCES

WILLIAM WILLIS & Co. Pty. Ltd.
98 Canterbury Road, Canterbury, Vic. 3126.
PHONE: (03) 836 0707

Awards

Ken Hall VK5AKH
FEDERAL AWARDS MANAGER
St George's Rectory, Alberton. SA. 5014

AWARDS ISSUED RECENTLY

DXCC PHONE

347 Bill Garvey VK2CWG

WAVKCA

1489 Club Station, Novorossisk UK6AAJ
1490 Victor H Apukhtin UW1CX
1491 Valery Matoushin UA9NN
1492 Paul Chipenko UA0LCM
1493 W W Kostjuk UB5MDL
1494 Mikhael Kamendrovsky UA1AWO
1495 George Alferyev UB5WJ
1496 Alex Zelenin UA3QJK
1497 Alex Ertskin UA0ABK
1498 Vladimir A Korolev UA0OO
1499 O E Novichkov UA9YDX

HAVKCA

116 Igor Tolmachev UA1 169 898
117 Alex Tkachenko UA3 147 122
118 Alexandr Maslow UJ8 040 207
119 S E Stepanov UA9 130 272

WIA 75 AWARD

Following is an update to recipients of the WIA 75 Award.

Cert No — 666 Eduard Anwar YC3CPJ
Cert No — 667 George R McKercher W0MLY
Cert No — 668 Donny Sirait YC6LD
Cert No — 669 Andrew Woolf VK2EPO
Cert No — 670 Soemardiono Isnaeni (Isna) YC3JVW
Cert No — 671 Herman Chosim YC3BR
Cert No — 672 Bambang Sutiyono YC2BLR

MARION CENTENARY AWARD

Further to the Marion Centenary Award which was announced in last month's column, the extremely attractive Award Certificates have been printed.

Each Award will be despatched in a sturdy mailing tube to ensure safe delivery.

See page 44, September AR for full details for claiming the Award.

INTERNATIONAL RADIOSPORT ASSOCIATION

The International Radiosport Association is an independent international organisation dedicated to the promotion of quality and sportsmanship in amateur radio. Its purposes and objectives are:

To promote international friendship and goodwill through sportsmanship, radio contesting and DXing.

To improve the quality of amateur radio operators and operating through education and experience, by voicing the opinions of radio amateurs that are experienced and have contributed to the hobby.

To promote amateur radio contesting and other operating-related activities as a sport, and to provide the publicity and recognition that it deserves in the public media.

To publish timely articles in the monthly magazine *Radiosporting,* to feature technical articles on equipment design and modification, antenna construction, radio-wave propagation, and commercial equipment reviews by qualified people.

To organise, as an annual event, the *International Contest Symposium,* which runs parallel (evenings) with the Dayton Hamvention; to feature timely topics with the participation of some of the world's leading amateurs at the symposium.

To hold an annual Awards Dinner with an entertainment program, where awards for various achievements are presented.

To maintain and publish all time record tables for significant contests

To sponsor and run an annual World Radio Championship Contest and World Contest Championship, based on results of a number of major contests, with the annual *Contester of the Year* awards in various categories.

To administer the *Contest Hall of Fame* and vote on awarding membership to those who have significantly contributed to the sport of contesting.

To co-ordinate and assist in the scheduling of international contests.

To hold regular weekly meetings on air, 14.200 and 3.380 MHz.

To provide an automatic, computer controlled bulletin station that transmits the latest DX and Contest news on CW and RTTY, 14.098 MHz.

All in all, the IRSA is dedicated to the pursuit of excellence and quality in amateur radio by promoting, publicising and leading the way.

Attractive numbered membership certificates and badges are issued to members.

IRSA is run by contesters who are selected for their accomplishments and it is independent of any national or commercial organisation.

IRSA will assist and sponsor Contest/DXpeditions, Trophies and other radio sporting and publicity events.

IRSA is a non-profit organisation, with all proceeds to be used to finance events and awards sponsored by IRSA and to cover expenses incurred by the Association.

IRSA members can display the IRSA logo on their QSL cards and correspondence; members agree to obey the Contester's Code of Ethics and to promote it.

The initial fee to join the IRSA id US$9; it includes the cost of a certificate and a badge. The yearly membership dues are US$4. (Or 22 and 10 IRCs respectively).

Honorary Life Membership will be awarded to those who significantly contribute to IRSA and the sport of contesting.

Members are entitled to be elected and to elect officers of IRSA. They will also enjoy many services and privileges offered exclusively to members.

IRSA Board of Directors

Yuri VE3BMV, George VE3MRN, Terry N6CW, Frank 9Y4VU, Sam ZS6BRZ, Dave Goodwin-Hill, Gyuri HA5JI, VE2ZP, Jiri OK2RZ, Tack JE1CKA, Bob VE3KZ, Karol VK2BQQ, Larry N7DD, Jim VE3IY, Martin VE3MR and Mike VE3JTQ.

DX Century Award

GENERAL RULES

The DXCA program is sponsored by the IRSA and *Radiosporting* magazine for all licensed radio amateurs and shortwave listeners all over the world.

All contacts must be made from the same country. Maritime, aeronautical and land mobile stations may operate from anywhere in the world.

Only contacts made after January 1, 1986 are valid for the basic award.

Awards for club stations will be issued to the club and not to an individual operator.

All amateur bands for which an applicant holds a valid license may be used, ***including*** new WARC bands.

QSL cards for the awards must be in the possession of the applicant. The application for the award must be certified by two licensed amateurs with a statement that the list of contacts and QSL cards agree. Any altering or forging will result in disqualification. The IRSA Awards Committee has the right to request the QSL cards for verification.

The ARRL DXCC countries list criteria will be used in determining what constitutes a "country." A particular operation or DXpedition does not have to be recognised by the ARRL in order to count for DXCA; ie Burma. As long as there is a reasonable proof that the operation took place as claimed, it will be recognised. If it is found in the future that certain operations were not legitimate, the credit for that operation will be removed from all applications claiming the operation in question.

All officially allowed modes of communication may be used: CW, SSB, AM, FM, Packet, RTTY, SSTV and Mixed-mode. Also separate categories will be recognised for satellite contacts, QRP, QRPp and mobile stations. All contacts must be two-way, using the same mode, except for the mixed mode. A valid contact must consist of a call sign and signal report exchange.

All claimed contacts must be made by the operators themselves, without the help of a third party; ie list or net operation. Non-interference with commercial services on shared bands, fair play and good sportsmanship are required of all DXCA holders and applicants. In the event of specific objections relative to continued poor operating ethics, an individual may be disqualified from the DXCA by action of the DXCA Awards Committee.

The application must contain a station's call sign, name and address, type of award applied for and list of contacts. The list of contacts and any

QSL cards in possession must include: call sign, signal report received, band, date, time in UTC, and two-way mode.

Call signs of all certificate holders will be published in *Radiosporting* magazine and a DXCA Honour Roll will be published twice a year.

The first 20 winners of monoband and multi-band awards will receive a free one year subscription to *Radiosporting* magazine.

The decision of the IRSA Awards Committee will be final.

All applications to be sent to IRSA — DXCA, Box 282, Pine Brook, NJ, 07058, USA.

SINGLE BAND DXCA

Single band DXCA Century Award is issued for working or hearing a minimum of 100 countries on one band. Endorsement stickers are issued in increments of 20 countries up to 240, increments of 10 up to 300 and increments of 5 above 300 countries.

Contacts made on all amateur bands (1.8, 3.5, 7, 10, 14, 18, 21, 24, 28 MHz and all VHF/UHF bands), as permitted by the license in the country of the applicant, are eligible for the award. All contacts must be made on one band. No cross-band contacts are allowed.

The basic award will be issued for a minimum of 100 countries confirmed on one band. A numbered endorsement sticker will be issued for each mode (CW, AM, SSB, FM, RTTY, Packet, SSTV and Mixed) and category (satellite, QRP, QRPp and mobile stations).

The holders of Single Band DXCA are allowed to use the abbreviation signifying the type of award and country total on their QSL cards.

Examples: 1.8 DXCA or 1.8 CW DXCA 124/265 which means Monoband: 1.8 MHz all CW mode, DXCA, 124 countries confirmed since January 1, 1986/number of countries worked.

MULTI BAND DXCA

6B DXCA, 7B DXCA, etc awards will be issued for confirmations from a minimum of 100 countries on each of at least six bands. A separate award will be issued for working 100 countries on 7, 8, or more bands.

Also, a cumulative total will be kept for an overall countries count similar to the monoband award: ie 7B DXCA (856/1265), which signifies that station has confirmed a minimum of 100 countries on each of seven bands and the total count is 856 countries since January 1, 1986 and 1265 countries on seven bands worked. A numbered sticker will be issued for each mode and category.

Stations having monoband DXCA need not submit the list of contacts already credited for monoband awards. It is sufficient to mention the certificate type and number, and only an additional list of contacts has to be submitted.

Stickers for increments of 100 countries will be issued from 600 to 2000, increments of 50, from 2000 and up.

The Honour Roll — listing of top contenders and latest changes in standings will be published in *Radiosporting* magazine twice a year.

The fee for each award is US$5 or 10 IRCs and each endorsement sticker is US$2 or 4 IRCs. Engraved Honour Roll Plaques will cost US$25.

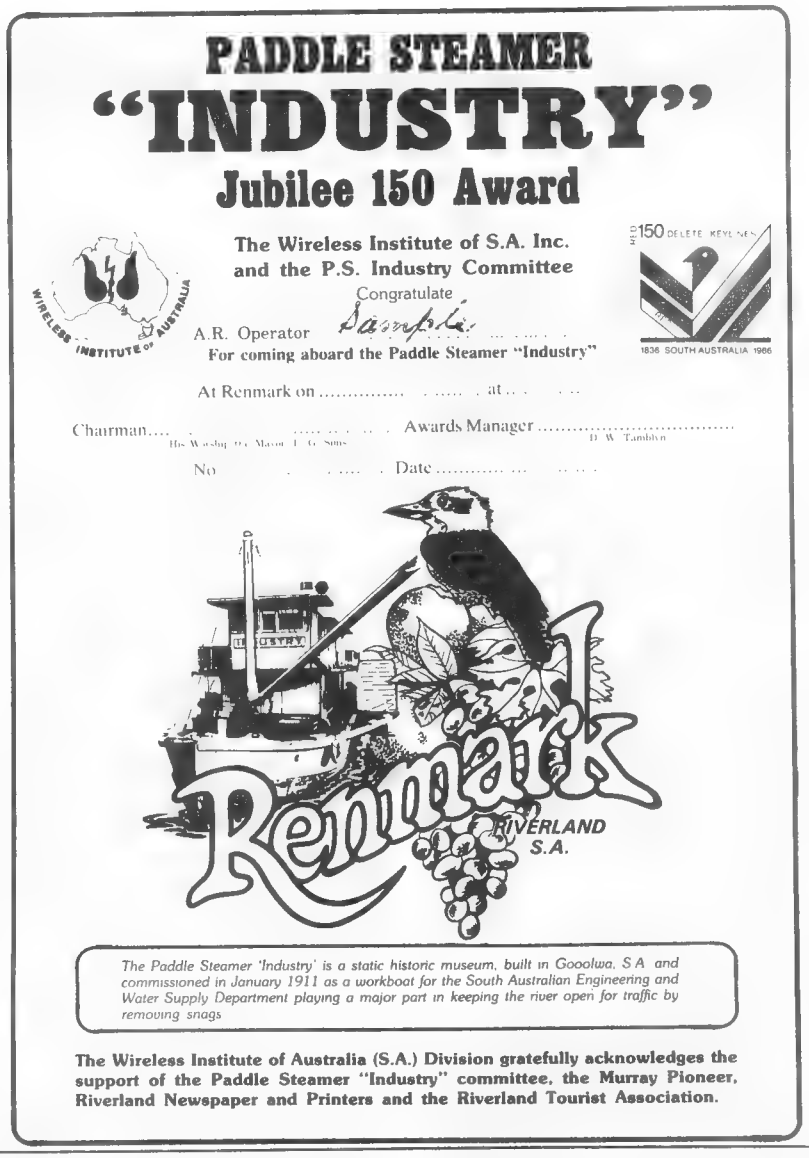
A set of application forms and countries list for DXCA awards are available from IRSA for an SAE and 3 IRCs.

THE PADDLE STEAMER *INDUSTRY* JUBILEE 150 AWARD

Further to the announcement of this award in last months Awards Column, an illustration of the award is presented this month.

The award is signed by the Mayor of Renmark, Mr Lionel Sims. It is a three coloured award depicting the paddle steamer *Industry* grouped with grapes and citrus fruit, local produce of the Riverland. There is also a short history of the PS *Industry*.

—Contributed by Doug Tamblyn VK5PDT, Awards Manager



NIGERIAN AMATEUR RADIO SOCIETY 25TH ANNIVERSARY CELEBRATION SPECIAL AWARD 1961-1986

During 1986, the Nigerian Amateur Radio Society celebrates its Silver Jubilee. To commemorate the occasion and to encourage more contacts with 5N-land, also to show the amateur radio community and friends around the world what NARS has achieved in the last 25 years, the Society will issue the above special award to any licensed amateur/SWL who works/hears amateur radio stations in the Federal Republic of Nigeria during 1986 under the following conditions:

— For stations located outside Nigeria five points are necessary.

These points are established as follows:

— Contact with each 5N station — one point
— Contact with a NARS club station — two points
— All modes, all allocated amateur bands

Send a list of contacts or log extract showing details of contacts/SWL reports, witnessed by two licensed amateurs. Contacts between January 1 and December 31, 1986 are valid for this award.

Cost is US$5 for an air mail return.

Address applications to: the Awards Manager, PO Box 2873, Lagos, Nigeria or PO Box 27522, Concord, Cal 94520, USA.

ar

AMATEUR PROJECTIONISTS

Information is required from Commercial Theatre Projectionists who are also amateurs with a view to a comprehensive article for *Amateur Radio*.

Considerable interest has already been shown from replies to a Hamad placed in August's AR, but more is required.

All interested amateurs should contact VK3AH, QTHR.

FLYING THE FLAG

The flying of the Australian flag at radio displays has not gone unnoticed.

Sam VK2BVS, was recently presented with a Certificate of Appreciation by Sir Colin Hines, President of the Australian National Flag Association, at a special ceremony at ANZAC House, Sydney.

Amateur radio made 100 new friends that evening as Sir Colin's words were broadcast over the 147 MHz repeater, to the delight of the VIPs that attended the presentation.

Electro-Magnetic Compatibility Report

Hans Ruckert VK2AOU
EMC REPORTER
25 Berrille Road, Beverly Hills, NSW. 2209

*E*lectro-*M*agnetic-*C*ompatibility difficulties are as old as radio communication. When G Marconi (Radio Amateur No 1) first operated more than one transmitter, QRM (interference) resulted. It became necessary to invent the "tuned circuit" to restrict the transmitted frequency spectrum and to improve the receiver selectivity. Now, about 90 years later, we are still dealing with the same problem!

Transmitter frequencies or channels and power levels are laid down in "recommendations" at world radio conferences of the *International Telecommunications Union* (ITU). These are at least partially adopted by the various national governments. Amateur radio frequency bands are also subject to the same ITU resolutions, which are largely adopted by national government authorities like the *Department of Communications* (DOC) in Australia, the FCC in USA, the FTZ in West Germany, etc. These resolutions cover the basic responsibilities and rights of all telecommunication transmitting services.

We now have a continuously growing number of electric/electronic services, appliances and apparatus which are not supposed to radiate electro-magnetic energy and which are not meant to transmit on frequencies allotted to telecommunication services (like amateur radio, government services, radio, television, etc). If such radiation occurs, it can cause interference and should be illegal. Appropriate standards define in some countries the maximum permitted power level and testing method for these radiations. Only radio services which violate international regulations, are likely to cause interference (jamming stations, woodpecker). A legally operated transmitter is not likely to cause interference, as long as transmitter and receiver standards are matched. Preference must be given to services which involve public safety and government business. Little more can be done on the transmitter side of any telecommunication service. Transmitters will always need effective aerials and adequate towers or masts (whether these are liked or not) and the permitted power level to fulfill their intended function. If legally operated transmitters affect receivers, amplifiers, or electronic signal processors, it may be likened to rain leaking through the roof. Do you stop the rain, or do you fix up the bad roof?

There are two kinds of receivers:

1. Electronic Apparatus or Devices, which are not supposed to receive legal radiation from communication transmitters, which have not been designed to be radio receivers, but whose intended function may be adversely affected by acting as receivers due to bad design. (An example is a car cruise control affected by the transmitter of the car radio telephone).
2. Television, Broadcast, Video Recorders, Preamplifiers and Accessories which should have enough selectivity/immunity to receive only transmissions from television or broadcast transmitters for which they are intended. They should be acceptably immune to legal transmissions from other frequency channels for which they are not designed, so that legal transmissions cannot be blamed for affecting their operation. If affected, only the receiver design (lack of selectivity), or in some cases non-linear devices nearby, may be held responsible.

Only the establishment, adoption and policing of adequate immunity standards for receiving and amplifying equipment of all kinds can result in logical, technically correct, fair and just compatibility of transmitter and receiver services. There is a wide spread popular view, still held by some members of the legal profession, that the unwanted signal reception effect can simply be stopped by closing down the transmitter. "They try to stop the rain, instead of fixing the leaking roof!" Stating that according to Common Law the legal transmission causes a "Public Nuisance," is an outdated logic, technically wrong (as admitted by some manufacturers), unfair and unjust.

More and more governments and appliance manufacturers recognise that receiver designers/manufacturers can and should contribute to solving or avoiding the ever increasing number and variety of EMC problems. The required know-how and technology has been developed long ago and is available in all countries. Much of the ground-work has been done by the EMC Commission representatives of the Association of Electrical Engineers (VDE), the West German Standards Association (DIN), the electronic industry, the FTZ (DOC), the German Amateur Radio Club (DARC, about 50 000 members) during years of meetings and technical work.

The measuring methods and EMC standards became West German law in 1981. In September 1982, the Australian Minister for Communications stated (as the law in West Germany already required) that the new Communications Act would probably specify standards for transmitters and receivers, and make it an offence to supply, possess or import equipment which does not meet the standards. The US President and the Senate signed into law at the same time the authority for the FCC to develop effective EMC standards. Nothing else will be of practical value!

It is hoped that these communication laws will also cover the Amateur Radio Service, as in West Germany where the law "G-1239-A" dated June 2, 1980, as special law, pre-empts the common law. The latter could be used unfairly against radio amateurs. Every effort should be made to ensure that the public, and especially the legal profession, see EMC problems in a logical, technical and fair manner. Co-operation of all concerned can usually overcome or at least reduce the problem without court cases.

To make the public aware of the EMC problem and the legal EMC standards, and to protect customers who intend to purchase a broadcast set, television set or Hi-Fi amplifier, etc the FTZ made it compulsory to have a FTZ warning letter in each equipment carton. This warning states the degree of immunity or compatibility with other services this type of apparatus has been tested to, and which unwanted effects lower EMC grades may produce. The government undertook to educate the customer — obviously a beneficial step. This is also "free advertising" for well made products, and should be supported by fair-minded manufacturers.

The proportion of the population who are radio amateurs is a definite indication of the stage of technological development a nation has attained. Peace-time emergency services and especially the war-time contribution rendered by the self-taught and privately financed Amateur Radio Service shows the importance of this activity. The practical experience of radio amateurs, supplementing formal engineering training, is often of benefit to the electronic industry.

Book Review

Gil Sones VK3AUI
30 Moore Street, Box Hill South, Vic. 3128

THE ARRL ANTENNA COMPENDIUM — VOLUME 1
Published by the ARRL

The *Antenna Compendium* is not your complete antenna book. It is not intended to serve that function, but rather, it is a collection of material of interest to antenna experimenters. Much of this material has not been published previously.

Antennae from 160 metres to 10 GHz are covered in the Compendium with Quads, Log Periodics, Verticals and Dielectric Antennas some of the antennas covered. Even antennas which work below the ground are covered.

Treatment ranges from the highly practical aspects of making an antenna to mathematical analysis. However, don't be frightened by the mathematics — the practical details more than make up for the maths.

Material is backed-up by an extensive bibliography so that you can explore interesting topics further. There is even one item submitted by an Australian amateur.

Summing up the *Antenna Compendium* provides some interesting and thought provoking material. It is a book for the amateur who has an interest in aerials.

QSP

HEEL AND TOE GROUNDERS

Plastistat heel and toe grounders establish a ground path between mobile personnel and conductive flooring. In the absence of this grounding mechanism, electro-static voltages on moving people can reach levels as high as 12 000 to 35 000 volts. The grounders dissipate static to zero voltage in less than 0.1s in all levels of humidity.

The heel grounder is comprised of a conductive rubber heel cup, two Velcro straps and a conductive, fabric band. This design fits a variety of mens and womens shoes including boots, flat soles, safety shoes and joggers.

The toe grounder is comprised of a conductive toe strap attached to an elastic fabric band, and provides effective ESD for most types of footwear.

Abridged from *Electronic News*, p26 — April 1986

AMSAT Australia

Colin Hurst VK5HI
8 Arndell Road, Salisbury Park, SA. 5109

OSCAR-10 APOGEES
OCTOBER 1986

DAY #	ORBIT #	APOGEE U.T.C HHMM:SS	SATELLITE CO-ORDINATES LAT DEG	LON DEG	BEAM HEADINGS SYDNEY AZ DEG	SYDNEY EL DEG	ADELAIDE AZ DEG	ADELAIDE EL DEG	PERTH AZ DEG	PERTH EL DEG
1st October										
274	2482	1121:49	-14	152	83	27	90	16		
274	2483	2301:20	-14	327					262	4
2nd October										
275	2484	1040:51	-14	142	89	19	95	8		
275	2485	2220:23	-14	318					267	12
3rd October										
276	2486	0959:54	-14	133	94	11	100	0		
276	2487	2139:25	-14	308			260	1	272	21
4th October										
277	2488	0918:56	-14	124	99	3				
277	2489	2058:28	-13	299	259	-1	266	9	277	29
5th October										
278	2491	2017:30	-13	290	264	6	271	17	283	38
6th October										
279	2493	1936:33	-13	280	269	14	277	25	291	46
7th October										
280	2495	1855:35	-13	271	274	22	283	33	301	54
8th October										
281	2497	1814:38	-13	262	280	30	291	41	316	61
9th October										
282	2499	1733:41	-13	252	287	39	300	49	337	66
10th October										
283	2501	1652:43	-13	243	296	47	313	56	4	67
11th October										
284	2503	1611:46	-13	233	307	54	331	61	30	65
12th October										
285	2505	1530:48	-13	224	323	60	353	64	48	59
13th October										
286	2507	1449:51	-13	215	345	64	17	63	61	51
14th October										
287	2509	1408:53	-12	205	9	65	37	59	70	43
15th October										
288	2511	1327:56	-12	196	32	61	52	52	77	34
16th October										
289	2513	1246:59	-12	187	48	55	63	45	83	26
17th October										
290	2515	1206:01	-12	177	61	48	72	37	88	17
18th October										
291	2517	1125:04	-12	168	70	40	79	29	93	9
19th October										
292	2519	1044:06	-12	158	77	32	85	21	98	1
292	2520	2223:38	-12	334					260	-2
20th October										
293	2521	1003:09	-12	149	83	24	90	13		
293	2522	2142:40	-12	324					265	6
21st October										
294	2523	0922:12	-12	140	88	15	95	5		
294	2524	2101:43	-12	315					270	14
22nd October										
295	2525	0841:14	-12	130	93					
295	2526	2020:45	-12	306			264	2	275	22
23rd October										
296	2527	0800:17	-12	121	98	-1				
296	2528	1939:45	-11	296	262	-0	269	10	281	30
24th October										
297	2530	1858:48	-11	287	267	7	274	18	288	39
25th October										
298	2532	1817:51	-11	278	272	15	280	26	296	47
26th October										
299	2534	1736:53	-11	268	278	23	287	34	308	55
27th October										
300	2536	1655:56	-11	259	284	32	296	42	324	61
28th October										
301	2538	1614:58	-11	249	292	40	306	49	346	65
29th October										
302	2540	1534:01	-11	240	301	47	320	56	11	65
30th October										
303	2542	1453:03	-11	231	314	54	338	60	33	61
31st October										
304	2544	1412:06	-11	221	331	60	0	62	50	55

NATIONAL CO-ORDINATOR
Graham Ratcliff VK5AGR
INFORMATION NETS
AMSAT AUSTRALIA
Control: VK5AGR
Amateur Check-In: 0945 UTC Sunday
Bulletin Commences: 1000 UTC
Winter: 3.685 MHz — Summer: 7.064 MHz
AMSAT PACIFIC
Control: JA1ANG
1100 UTC Sunday
14.305 MHz
AMSAT SW PACIFIC
2200 UTC Saturday
21.280/28.878 MHz

Participating stations and listeners are able to obtain basic orbital data, including Keplerian elements from the AMSAT Australia Net. This information is also included in some WIA Divisional Broadcasts.

ACKNOWLEDGMENTS
Contributions this month are courtesy Bob VK3ZBB, Graham VK5AGR, and *AMSAT-Telemail.*

OSCAR-10 STATUS
As reported in last months column, OSCAR had been affected by radiation exposure and had suffered operational difficulties. Through the diligent work of Karl DJ4ZC, in rewriting the OSCAR-10 software, a new operating system, IPS-C4, was uploaded to the spacecraft to return it to an operational condition.

At the time of preparation of this column the onboard computers memory has had another cosmic "hit" and the inoperational condition is with us again. It is hoped that by the time you are reading this, the spacecraft will once again be operational.

SUCCESSFUL LAUNCH OF OSCAR-12/ JAS-1
The Japanese Amateur Satellite, JAS-1, was successfully launched on August 12, 1986 at 2045 hours. In recent months, this column has carried the general specifications of the spacecraft.

This month, we have the technical descriptions and appropriate formulae for the telemetry systems and the operational details for the Packet Radio experiment being carried on JAS-1.

WARNING! ! !
It is my understanding that JAS-1 has an overload detection system incorporated in the spacecraft's hardware and that when the spacecraft is totally released for general usage, the overload circuitry will automatically switch to an alternate mode, eg from Analogue Transponder Operation to Digital Transponder Operation, should excessively HIGH INPUT signals be detected in the passband. It is requested that uplink signals be limited to ensure that the downlink is no stronger than the beacon on 435.795 MHz.

Therefore, be warned, that should the transponder switch off — you may have been the irresponsible person who caused it! Just in case you think only the Americans and Europeans are the *alligators* within the OSCAR-10 passband just tune through the passband. The current Australian *alligators* on OSCAR-10 who migrate to OSCAR-12/JAS-1 are going to achieve significant notoriety when they shutdown the transponders. Enuff said! ! !

JAS-1 CE Telemetry Calibration Equations
Format of CW (at 20 WPM) telemetry on:

HI	HI		
1A	1B	1C	1D
2A	2B	2C	2D
3A	3B	3C	3D
4A	4B	4C	4D
5A	5B	5C	5D

Therefore, CW telemetry has 20 channels of data and each channel is made up of three digits. The numbers 1 to 5 shown above indicate channel numbers, and each letter (A, B, C, and D) stands for two digits.

Channels through 1A to 3D show analog data,

while the rest (4A to 5D) indicates status points to be described below.

The Analog Telemetry Data

The number in each channel represents a two digit *Decimal* number; ie in the range 00 to 99. example: 123 ---> number is 23 (decimal) ---> N = 23.

Ch. #	Parameter	Equation
1A	Total Solar Array Current	20.0 * (N + 4.0) mA
1B	Battery Charge/Discharge	40.0 * (N - 46.0) mA
1C	Battery Voltage	(N+4) * 0.22 V
1D	Half-Battery Voltage	(N+4) * 0.098 V
2A	Bus Voltage	(N+4) * 0.20 V
2B	+ 5 V Reg Voltage	(N+4) * 0.06 V
2C	JTA Power Output	2 * (N+4) ^1.618 mW
2D	Calibration Voltage #1	(N+4) / 50 V
3A	Battery Temp	1.50 * (62.0 - N) deg C
3B	Baseplate Temp #1	1.50 * (62.0 - N) deg C
3C	Baseplate Temp #2	1.50 * (62.0 - N) deg C
3D	Baseplate Temp #3	1.50 * (62.0 - N) deg C

OSCAR-10 APOGEES
NOVEMBER 1986

DAY #	ORBIT #	APOGEE U.T.C HHMM:SS	SATELLITE CO-ORDINATES LAT DEG	LON DEG	SYDNEY AZ DEG	SYDNEY EL DEG	ADELAIDE AZ DEG	ADELAIDE EL DEG	PERTH AZ DEG	PERTH EL DEG
			I----------BEAM HEADINGS----------I							
1st November										
305	2546	1331:09	-11	212	352	62	22	60	61	47
2nd November										
306	2548	1250:11	-10	203	15	62	40	55	70	39
3rd November										
307	2550	1209:14	-10	193	35	58	53	49	77	31
4th November										
308	2552	1128:16	-10	184	50	52	64	41	83	22
5th November										
309	2554	1047:19	-10	174	61	44	72	33	88	14
6th November										
310	2556	1006:21	-10	165	70	36	78	25	93	6
7th November										
311	2558	0925:24	-10	156	77	28	84	17	98	-2
311	2559	2104:55	-10	331					263	-1
8th November										
312	2560	0844:27	-10	146	83	20	90	9		
312	2561	2023:58	-10	322					268	7
9th November										
313	2562	0803:29	-10	137	88	12	95	1		
313	2563	1943:00	-10	312					273	15
10th November										
314	2564	0722:32	-10	128	93	4				
314	2565	1902:03	-10	303			267	4	279	23
11th November										
315	2567	1821:06	-9	294	265	1	272	11	285	32
12th November										
316	2569	1740:08	-9	284	270	9	278	19	292	40
13th November										
317	2571	1659:11	-9	275	276	17	284	27	302	48
14th November										
318	2573	1618:13	-9	266	282	25	292	35	314	55
15th November										
319	2575	1537:16	-9	256	289	33	301	43	332	60
16th November										
320	2577	1456:16	-9	247	297	40	312	50	353	63
17th November										
321	2579	1415:18	-9	237	307	48	327	55	17	62
18th November										
322	2581	1334:21	-9	228	321	54	345	59	36	58
19th November										
323	2583	1253:24	-9	219	338	59	6	59	51	51
20th November										
324	2585	1212:26	-8	209	359	60	26	57	62	44
21st November										
325	2587	1131:29	-8	200	20	59	42	52	70	36
22nd November										
326	2589	1050:31	-8	191	37	54	54	45	77	27
23rd November										
327	2591	1009:34	-8	181	51	48	64	38	82	19
24th November										
328	2593	0928:37	-8	172	61	41	72	30	88	11
25th November										
329	2595	0847:39	-8	162	70	33	78	22	92	2
26th November										
330	2597	0806:42	-8	153	76	25	84	14		
330	2598	1946:13	-8	328					266	0
27th November										
331	2599	0725:44	-8	144	82	17	89	6		
331	2600	1905:16	-8	319					271	8
28th November										
332	2601	0644:47	-8	134	88	8	95	-2		
332	2602	1824:18	-8	310					277	16
29th November										
333	2603	0603:49	-7	125	93	1				
333	2604	1743:21	-7	300			270	5	283	24
30th November										
334	2606	1702:23	-7	291	268	2	276	12	289	33

Status Telemetry Data Format

The number in each channel represents two digit *Octal* number, whose range is between 00 and 37 (0 to 31 in decimal, 00 to 1F in hexadecimal).

Therefore, only five lower bits are valid as data. Each bit represents the various status shown in the following table.

note:
bit 0 is LSB (Least Significant Bit)
bit 4 is MSB (Most Significant Bit)
example: 432 --> 32 (Octal) = 11010 (Binary)

bit 0 (LSB)	0
bit 1	1
bit 2	0
bit 3	1
bit 4 (MSB)	1

Ch #	Bit	Item	1	0
4A	0	JTA Power	On	Off
4A	1	JTD Power	On	Off
4A	2	Eng Data #1		
4A	3	Eng Data #2		
4A	4	JTA Beacon	PSK	CW
4B	0	UVC Status	On	Off
4B	1	UVC Level	1	2
4B	2	Battery Status	Tric	Full
4B	3	Battery Logic	Tric	Full
4B	4	Main Relay	On	Off
4C	0	PCU Status	Bit 1 (LSB)	
4C	1	PCU Status	Bit 2 (MSB)	
4C	2	PCU Control	Manual	Auto
4C	3	Eng Data #3		
4C	4	Eng Data #4		
4D	0	Memory Unit #0	On	Off
4D	1	Memory Unit #1	On	Off
4D	2	Memory Unit #2	On	Off
4D	3	Memory Unit #3	On	Off
4D	4	Computer Power	On	Off
5A	0	Memory Select	Bit 1 (LSB)	
5A	1	Memory Select	Bit 2 (MSB)	
5A	2	Eng Data #5		
5A	3	Eng Data #6		
5A	4	Eng Data #7		
5B	0	Solar Panel #1	Lit	Dark
5B	1	Solar Panel #2	Lit	Dark
5B	2	Solar Panel #3	Lit	Dark
5B	3	Solar Panel #4	Lit	Dark
5B	4	Solar Panel #5	Lit	Dark
5C	0	CW Beacon Source	CPU	TLM
5C	1	Eng Data #8		
5C	2	Eng Data #9		
5C	3	Eng Data #10		
5C	4	Eng Data #11		
5D	0	Eng Data #12		
5D	1	Eng Data #13		
5D	2	Eng Data #14		
5D	3	Eng Data #15		
5D	4	Eng Data #16		

JAS-1 PSK Telemetry Calibration Equations

JAS-1 Telemetry Data Format
JAS-1 FF YY/MM/DD HH:MM:SS
xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx
sss sss sss sss sss sss sss sss sss sss

FF: = Frame Identifier	RA: Realtime Telemetry — ASCII RB: Realtime Telemetry — Binary SA: Stored Telemetry — ASCII SB: Stored Telemetry — Binary M0:Message #0 M1:Message #1 . . . . . . M9:Message #9

YY/MM/DD = Date
HH:MM:SS = Time (UTC)
The following is valid only for RA and SA frames.

xxx = 000 - 999	Format: 3 digit decimal (Analog Data) 27 samples in row 0 column 0 thru row 2 column 6 (denoted #00 - #26 below)
y = 0 - F	One Byte Hex (System Status Data) 9 samples in row 2 column 7 thru row 2 column 9 (denoted #27a - #29c below)
s = 0 or 1	Binary Status Data 30 samples in row 3 thru row

3 column 9
(denoted #30a - #39c below)

JAS-1 Telemetry Calibration Equations

CH #	ITEM	EQUATION
00	Total Solar Array Current	1.91 * (N - 4) mA
01	Battery Charge/Discharge	3.81 * (N - 264) mA
02	Battery Voltage	N * 0.0210 V
03	Half-Battery Voltage	N * 0.00937 V
04	Bus Voltage	N * 0.0192 V
05	+ 5 V Regulator Voltage	N * 0.00572 V
06	- 5 V Regulator Voltage	N * -0.00572 V
07	+10 V Regulator Voltage	N * 0.0116 V
08	JTA Power Output	5.1 * (N - 158) mW
09	JTD Power Output	5.4 * (N - 116) mW
10	Calibration Voltage #2	N / 500 V
11	Offset Voltage #1	N / 500 V
12	Battery Temperature	0.139 * (689 - N) Deg C
13	JTD Temperature	0.139 * (689 - N) Deg C
14	Baseplate Temperature #1	0.139 * (689 - N) Deg C
15	Baseplate Temperature #2	0.139 * (689 - N) Deg C
16	Baseplate Temperature #3	0.139 * (689 - N) Deg C
17	Baseplate Temperature #4	0.139 * (689 - N) Deg C
18	Temperature Calibration #1	N / 500 V
19	Offset Voltage #2	N / 500 V
20	Facet Temperature #1	0.38 * (N - 684) Deg C
21	Facet Temperature #2	0.38 * (N - 684) Deg C
22	Facet Temperature #3	0.38 * (N - 690) Deg C
23	Facet Temperature #4	0.38 * (N - 683) Deg C
24	Facet Temperature #5	0.38 * (N - 689) Deg C
25	Temperature Calibration #2	N / 500 V
26	Temperature Calibration #3	N / 500 V

JAS-1 System Status Telemetry Bytes

Ch # Item
27a Spare (TBD)
27b Spare (TBD)
27c Spare (TBD)

28a Spare (TBD)
28b Spare (TBD)
28c Memory Unit #0 error count

29a Memory Unit #1 error count
29b Memory Unit #2 error count
29c Memory Unit #3 error count

JAS-1 Binary Status Data Points

Ch #	Item	1	0
30a	JTA Power	On	Off
30b	JTD Power	On	Off
30c	JTA Beacon	PSK	CW
31a	UVC Status	On	Off
31b	UVC Level	1	2
31c	Main Relay	On	Off
32a	Engineering Data #1		
32b	Battery Status	Tric	Full
32c	Battery Logic	Tric	Full
33a	Engineering Data #2		
33b	PCU Status	Bit 1 (LSB)	
33c	PCU Status	Bit 2 (MSB)	
34a	Memory Unit #0	On	Off
34b	Memory Unit #1	On	Off
34c	Memory Unit #2	On	Off
35a	Memory Unit #3	On	Off
35b	Memory Select	Bit 1 (LSB)	
35c	Memory Select	Bit 2 (MSB)	
36a	Engineering Data #3		
36b	Engineering Data #4		
36c	Computer Power	On	Off
37a	Engineering Data #5		
37b	Solar Panel #1	Lit	Dark
37c	Solar Panel #2	Lit	Dark
38a	Solar Panel #3	Lit	Dark
38b	Solar Panel #4	Lit	Dark
38c	Solar Panel #5	Lit	Dark
39a	Engineering Data #6		
39b	CW Beacon Source	CPU	TLM
39c	Engineering Data #7		

Example:
JAS-1 RA 86/08/01 09:00:00
500 xxx xxx xxx xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx xxx xxx xxx xxx
xxx xxx xxx xxx xxx xxx xxx 000 004 yyy
01s sss sss sss sss sss sss sss sss sss
Real time ASCII frame sent on 86/08/01 at 09.00.00 UTC
Total Solar Array Current = 947 mA
Memory Unit #0 error count = 4
JTA power off
JTD power on

JAS-1 Packet BBS User Interface Information

Mailbox Commands (Basic users training)
1. Summary
1.1 Available commands
F: List files addressed to all or to current user
H: Help
K: Kill file/s
M: List file/s to/from current user
R: Read file/s
W: Write file
1.2 Command syntax
The general format is: <a command letter> <space> <argument>. At least one blank is required between <a command letter> and <argument>. 2. Command Prompt
JAS-1 Mailbox supplies a prompt "JAS>" with no CR or LF to indicate that the system is ready to accept a command from the user.
A user can "type ahead" commands while JAS-1 is sending messages or data to the user. JAS-1 will execute the commands in the waiting queue later.

3. Commands
3.1 The "F" Command
F = FILES. Shows the latest 10 files the first time it is entered during a session. Subsequent 'F' commands will list the next 10 active files (messages). A message posted to multiple users has "*" in its 'To:' destination field. See also the "M" command described below.
example:
JAS>F

NO	DATE	FROM	TO	SUBJECT
117	10/12	F8ZS	All	ARSENE update
116	10/12	DL3AH	All	Abgleichanleitung der AFREG
114	10/11	JA1RL	All	JAS-1 new schedule
113	10/11	WA2LQQ	All	ALINS for Phase-3C
112	10/10	JA1DSI	All	Who manages HK0XX QSL?
111	10/10	G3AAJ	*	Harry in London
110	10/09	W0RPK	All	P-3C countdown #8
107	10/09	9M2CR	All	NMCR AMTOR mailbox now QRV
103	10/06	JR1FIG	JA9BOH	Uchiawase wa raishuu?
102	10/09	N7FDA	*	RS-232c card for PC-1089

JAS>F

101	10/09	G3RUH	All	New software for BBC
100	10/08	JR1ING	JR1FIG	Sara ni kogata no TNC
99	10/08	JA1TUR	All	AFDEM-JA #3 in progress
98	10/08	N5AHD	All	Call for papers
96	10/08	KA9Q	All	TCP/IP on TAPR NNC
95	10/08	N5AHD	JR1FIG	Automatic tracking system
94	10/07	DJ6KQ	All	IPS-RA enhancements
93	10/07	DB2OS	All	Wettersatelliten
92	10/07	DB2OS	All	RUDAK-Statusreport
85	10/07	5H3KK	All	Now QRV on JAS-1

3.2 R <file#1>, <file#2>, <file#3>, ..., <file#7>, <file#8>

R = READ/ Read file/s (messages) specified by file number/s you got from the 'F' command. Up to eight files can be specified.
example:
JAS>R 95,102

Posted: 86/10/08 17:33 UTC
From: N5AHD
To: JR1FIG
Subj: Automatic tracking system

Dear Saya,
Thank you for your compliments on the manual you received from G3AAJ. Two computers are now used — one for control of antenna system, radios, and so forth and another one is used for the actual data capture. The system now allows several satellites to be selected and data ports, tracking priorities, modulation mode, and other things to be associated with each. I have been working on a couple of articles describing the new system and would be glad to send you copies when I am finished.
73, Robert. J. Diersing, N5AHD

Posted: 86/10/09 03:21:42 UTC
From: N7FDA
To: JR1FIG, JA1JHF
Subj: RS-232c card for PC-1089

Saya,
I need one more RS-232c card for my old faithful PC-1089. Would you ask Kanawa san if he could still get one in Akihabara?
Miki

3.3 W (call1, call2, call3, ..., call7, call8)

W = Write. Send message (file) to others. As many as eight destination addresses can be specified. The part of the command line in brackets (call1, call2, call3 . . .) is optional. A message without specific destination is "public", ie address to "All".

The JAS-1 mailbox will then prompt you to send the subject field by sending "Subj:". You can send a subject field with up to a 32 character string. After receiving the "Text:" prompt, you enter the message text, ending each line with <cr> (carriage return). You terminate with either a
<cr>.<cr>
or <cr> <ct1-Z> <cr>
(ie a line containing only a period or a control-Z) to indicate end of your text.

example:
JAS>W N7FDA
Subj: Roger, wait for a while.
Text:
Miki,
Roger, I'll immediately call him up and get an info for your "Main Frame".
I am going to put that info during next orbit.
Saya
^Z

3.4 K <file#1>, <file#2>, <file#3>, ... <file#7>, <file#8>

K = KILL! Delete file/s (messages) specified by file numbers. The <file#> is the same one described in R command. Up to eight files can be specified in a command line. A user can only delete files addressed solely to himself (ie not to multiple users) or files he posted.

3.5 H
H = HELP! Entering H <cmd> gives additional information on that command.
Entering only H will give a list of all available commands.

3.6 M
M = Mine. List the latest 10 files (messages) that are either to or from the current user. Additional M commands list additional active messages. This command will be useful to save channel time when the user only wants to see his messages.

JAS>M

NO	DATE	FROM	TO	SUBJECT
111	10/10	G3AAJ	*	Harry in London
103	10/06	JR1FIG	JA9BOH	Uchiawase wa raishuu?
102	10/09	N7FDA	*	RS-232c card for PC-1089
100	10/08	JR1ING	JR1FIG	Sara ni kogata no TNC
95	10/08	N5AHD	JR1FIG	Automatic tracking system

SATELLITE ACTIVITY FOR THE MONTH OF JUNE 1986

1. LAUNCHES

The following launching announcements have been received:

1986-042A (16758)	Cosmos 1748	June 06	USSR
1986-042B (16759)	Cosmos 1749	June 06	USSR
1986-042C (16760)	Cosmos 1750	June 06	USSR
1986-042D (16761)	Cosmos 1751	June 06	USSR
1986-042E (16762)	Cosmos 1752	June 06	USSR
1986-042F (16763)	Cosmos 1753	June 06	USSR
1986-042G (16764)	Cosmos 1754	June 06	USSR
1986-042H (16765)	Cosmos 1755	June 06	USSR
1986-043A (16767)	Cosmos 1756	June 06	USSR
1986-044A (16769)	Horizont 12	June 10	USSR
1986-045A (16772)	Cosmos 1757	June 11	USSR
1986-046A (16791)	Cosmos 1758	June 12	USSR
1986-047A (16798)	Cosmos 1759	June 18	USSR
1986-048A (16800)	Cosmos 1760	June 19	USSR
1986-049A (16802)	Molniya 3-29	June 19	USSR

2. RETURNS

During the month 39 objects decayed including the following satellites:

1986-028A	Cosmos 1739	June 07
1986-032A	Progress 26	June 23
1986-035A	Soyuz TM	May 30
1986-036A	Cosmos 1744	June 04
1986-040A	Cosmos 1746	June 12
1986-041A	Cosmos 1747	June 12
1986-045A	Cosmos 1757	June 25

JAS-1

HI HI from space . . .
Eight minutes late!

Wednesday, August 13, had amateur radio operators around the world listening anxiously for the first signs of life from the latest amateur radio satellite.

Amateurs have used the Morse code letters HI for decades to indicate laughter, probably because of the sound of the Morse letters: di di di dit di dit.

It was fitting, therefore that the satellite radio transmitter would first send this message back to earth.

Launched by the controlling body of amateur radio in Japan, the Japanese Amateur Relay League, JAS-1 Satellite was due to blast into space from the Tanega-shima Space Centre at 2031 UTC.

The satellite was carried as payload on the test launch of Japan's H-I launcher and, as such, did not attract the many millions of dollars fees commanded by other methods of launching.

Even so, the satellite itself had to be funded entirely by amateur operators.

With separation from the launch vehicle over Chile at one hour 10 minutes after launch, the first pass over Sydney should have been at 2248 hours UTC (08.48 am).

Licensed radio amateurs employed by Dick Smith Electronics head office in Sydney set up a special station using the DSE Amateur Radio Club's call sign, VK2DRS, to listen out for the telemetry signals from JAS-1, indicating all had gone well.

The JAS-1 satellite includes a beacon which continually transmits Morse data on approximately 435.795 MHz, in the 70 cm amateur band.

Operators at VK2DRS had some anxious moments as 2248 UTC came and went with no sign of signals from space.

Then, some eight minutes later, at 2256, came the sound of laughter everyone was waiting for: HI HI, followed by groups of numbers as the spacecraft transmitted data back to earth.

The laughter from space was echoed on the ground as the amateurs realised all was well.

Within a few days the spacecraft would be ready to act as a relay station in space, where amateurs from any country could call other stations around the world via transponders on the vehicle.

And within a month or two, JAS-1 will become the first "Packet" radio repeater, allowing fully automatic, unmanned communication between amateur radio stations having the necessary computer equipment.

The equipment used at VK2DRS/P was a Yaesu FT-726R All Mode VHF/UHF transceiver with 70 cm and satellite options and an RF Aerospace SAT7018GR 18 element 70 cm Yagi antenna. A Yaesu FR-7700 receiver was also used to monitor AMSAT's information service from the US on 20 metres.

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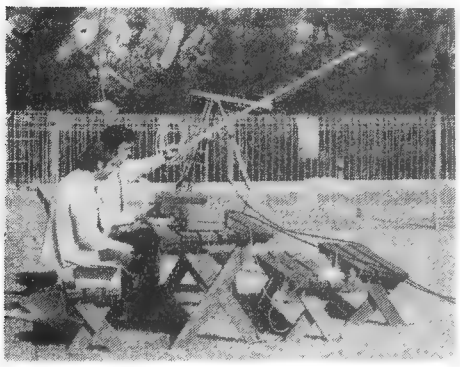
The club station VK2DRS/P listens for JAS-1 on the morning of August 13. Operators are Ross VK2KRT and Andrew VK2XKK.
—Photograph taken by Garry VK2YBX and presented courtesy Wendy Giles of *Dick Smith Electronic*

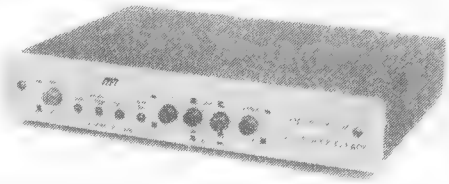


EASY RTTY/CW OPERATION

The MFJ-1224 Computer Interface, a small neat package which hooks-up between a radio receiver/transceiver and the users computer, is designed to make RTTY, CW ASCII and AMTOR operations a breeze.

It is supplied complete with CW and RTTY software to suit the VIC-20 and C- 64 computers, but its versatility allows it to be used with almost any personal computer providing it has the appropriate software. Additionally, the unit is fully AMTOR compatible when used with a computer equipped with AMTOR software.

The MFJ-1224 can copy on all the standard shifts — 170 Hz, 425 Hz, and 850 Hz plus other shifts between and beyond. When running the 170 Hz shift a sharp eight-pole active filter is automatically switched in which very effectively cleans the majority of noise off the incoming signal. It automatically copies CW speeds from five to 100 WPM and up to 300 Baud on RTTY.



A unique feature of the 1224's design allows it to copy on both mark and space tones, which greatly improves copy during adverse conditions. A built-in automatic noise limiter helps suppress static crashes and provides better copy whilst a Normal/Reverse switch eliminates retuning while stepping through various RTTY speeds and shifts.

Other features also include a +250 volts DC output to directly drive a RTTY machine, a speaker output and an easy to use two LED tuning indicator system

For further information please contact the Australian Distributor, GFS Electronic Imports, 17 McKeon Road, Mitcham, Vic. 3132. Phone: (03) 873 3777.

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RECEIVE SIGNALS FROM AROUND THE WORLD ON A SCANNER

With the addition of a small $99 box, your programmable scanner can now listen to signals from the other side of the globe.

Manufactured by GFS Electronic Imports, the new *Worldscan* shortwave and broadcast converter for programmable scanning receivers (complete with a supplied three metre wire antenna), can add hours of listening pleasure to your scanning operations.

The *Worldscan* is smaller than a cigarette packet, runs from its own in-built nine volt battery and simply plugs into the antenna socket of the scanner. The host scanner can then cover an additional frequency range from 300 kHz to 25 MHz. This makes it possible to listen to local AM broadcast stations as well as hundreds of overseas AM broadcasters who use the shortwave bands. These stations include the Voice of America and the BBC.

The *Worldscan's* output frequency range is from 120.300 to 145.000 MHz so that, for example, a 7.500 MHz shortwave signal would be found on 127.500 MHz.

For further information please contact GFS Electronic Imports, 17 McKeon Road, Mitcham, Vic. 3132. Phone: (03) 873 3777.

ar

A CONNECTOR THAT ABLY ACCOMMODATES BIG AMP OUTPUTS

A new audio connector system from Utilux has set an industry standard by providing a solution to the problems of amplifier-speaker connection that have been growing since the 60s with the growth in loudspeaker wattage.

The Utilux UX series of high power audio connectors has the ability to reliably transmit signals with a dynamic range from micro-volts to a hefty 30 amperes.

Since the 60s when audio amplifiers were considered "low level signal" — around 20 watts — audio amplifier output powers have been gradually increasing to today's high levels, commonly exceeding 1000 watts and often reaching 3600 watts.

Over the years, amplifier output connectors have remained largely unchanged. Increasingly powerful and sophisticated equipment has continued to bear the inadequacies of banana plugs and phone jacks developed in the 'low signal 60s.' This has meant not only signal impedance, but electrical safety standards were often dangerously compromised by very high amperage.

The UX series provides high current, large cable (8 x 14 mm) capacity with no risk of shortage or of electrocution. Terminated to 10 AWG cable, connector temperature does not rise above cable temperature even with 30 ampere continuous load.

The system comprises two parts — a cable end connector — UX100 — and a panel mount connector — UX500. To accommodate existing standards, the UX500 has the same cutout profile as an XLR type female socket. Two UX100 connectors can be mated for cable-to-cable connection, or one UX100 can be mated with one UX500 for cable-to-equipment connection.

A genderless format cleverly defies *Murphy's Law* in either connection by ensuring correct polarisation and the impossibility of a mismatch.

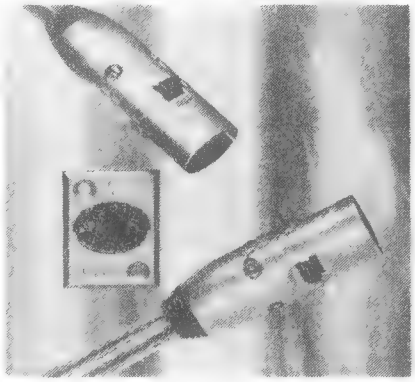
Amplifier to speaker connections in the UX system are positively identified by a distinctive oval shape measuring 17 x 24 mm.

The UX system can be easily assembled using a soldering iron and screwdriver. Contacts are supplied separately, soldered to the cable by the user, and then snapped into the connector body. This facilitates equipment assembly and avoids melting the insulator when soldering to heavy cable.

Fully assembled, the connectors provide the highest level of safety with total insulation between contacts and the metal shell.

The connector contacts are formed from a copper-iron alloy and silver- plated (or gold-plated to special order) with a total contact area of 30 mm squared and solder cup for up to 3 mm diameter conductors. As specified in IEC safety standards, the contacts cannot be shorted during connections and are finger inaccessible to prevent electric shock.

Inherent in the connector system is also a superior robustness, combining rugged die-cast



alloy construction with positively latch locking and a super-strength stainless-steel bar cable clamp. Both flat and round cable can be secured to withstand up to 30 Newton pull out force.

Offering audio professionals a connection system of the same high calibre as their amplifiers and loudspeakers, the Utilux UX series provides not only a long sought quality but an opportunity to finally standardise this area of common practice.

For further information please contact Utilux Pty Ltd, 14 Commercial Road, Kingsgrove, NSW. 2208.

ar

QSP

LASERS TO ETCH MICROCHIPS

In the traditional process for manufacturing ICs, as many as 100 individual steps may be required. Each step increases the risk that the finished product will contain some flaw that renders the chips unusable. Depending on the size and complexity of the chip, less than half of the finished wafer may yield acceptable chips, leaving the surviving chips to recover the entire cost of fabrication.

Not surprisingly, IC manufacturers are constantly seeking ways to improve yield and reduce costs. In one new technique, a laser used as a photo- etching device scans the surface of a silicon wafer in the presence of certain gases. Under static conditions, these gases have no effect on silicon; the energy of the laser, however, decomposes the gases into compounds that define active elements and interconnects by either etching away unwanted material or by deposition onto the substrate. The source and drain regions of a transistor are made by doping the silicon with phosphorus, which the laser creates by breaking molecules of phosphine gas. Hydrogen chloride, which serves as an etchant, is activated by the thermal energy of the laser beam. Interconnects on the chip are made by similarly decomposing gases that contain tungsten, nickel, and polysilicon.

One of the major incentives for this new method is a national program, led largely by the Departments of Defences and Energy, to develop new classes of super-computers. Much of this work has been done at the Lawrence Livermore National Laboratory, where experiments indicate that the technique can produce as many as 1000 transistors per second. At this rate, it would be possible to fabricate super-computer chips — consisting of about 100 000 transistors each — at the rate of one per day.

Other exciting possibilities include repairing damaged high-value chips and turning a new design into a prototype chip in one day or less, as opposed to today's turnaround time of one to four weeks.

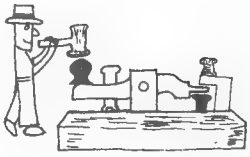
—Reprinted from *ham radio*, July 1986

WAFERSCALE INTEGRATION

This technique uses the surface of a silicon wafer to implement an entire functional capacity. Examples include complete 32-bit microprocessors, with memory and all relevant I/O functions, a "silicon" hard disk with 20 MB of storage, RAM speed, and all disk controller functions on a single wafer.

WaferScale integration promises to make very complex functions available in a single package. But this improvement is not without peril. Because of the large amount of circuitry and the extensive processing required on such devices, any mistake in fabrication results in a very expensive piece of scrap. Also, the large number of circuits and functions possible with WSI makes packaging considerations a major concern; it may be necessary to have hundreds of pins on a very complex functional element — more than can now be accommodated. However, the general benefits of WSI seem to justify the complexities of making such devices, and within the next few months the first few WSI products are expected to be announced.

—Reprinted from *ham radio* July 1986



Pounding Brass

Marshall Emm VK5FN
Box 389, Adelaide, SA. 5001

Hello again, and welcome to October (he says cheekily, writing in early August!). Well, first of all, a reminder that the National Sprints are only a month away, with the CW Sprint taking place on Saturday, November 15. The full rules should be in the Contests Column this month, and I am sure you will agree that everything possible has been done to Keep It Simple. Please think seriously about having a bash at it, even if you are not a "contester." It will not take a lot of time, it should be good fun, and certainly provide a bit of a challenge.

Just a bit of food for thought . . . in drafting the rules I asked for, and got, the much appreciated assistance of Ian VK5QX, who is the Federal Contest Manager. There was only one point we disagreed on, and in the finish we "agreed to disagree." That is the format of the serial number required for each exchange. You will note that the rules say that the serial number must be a three digit number but can start with any number. Ian feels very strongly that serial numbers should start with 001 in all cases.

My reasons for preferring a start at any number are threefold. First, a zero takes a *long* time to send in Morse. Not all operators, and specifically not all of the slower ones, use the letter "T" to represent zero, so a start at, say 500, can save a bit of time where zeros are sent. Second, (and I admit this has limited relevance, but it includes yours truly) some keyers have a facility for generating contest numbers, but the first digit cannot be a zero. Third, and most important, if everyone starts at 001 it is easy to see where one stands in the contest at any given time. Ian thinks this is a good thing, but Ian is a very competitive contester. I think it tends to discourage late starters and slower operators. If you do not know where you stand you may continue longer than if you know you don't have a hope of catching up. Anyway, there it is, and we will see how a reversion to free numbering works in the Sprints.

Now I promised to write about the Adelaide Hills Amateur Radio Society's visit to the OTC Coast Radio Station (Adelaide Radio) at McLaren Vale. For the benefit of the club members who were unable to visit the facility, the manager, Fred Reeve VK5YK, attended the Society's last meeting and spoke on the subject of the services provided by the CRS. It was a most enjoyable and informative talk, and if all CRS managers are of Fred's calibre, it would be well worth any club secretary contacting the nearest one.

First, the significance of all this in relation to this column, which, after all, is about CW operation and not commercial communications. From that point of view, you will be interested and perhaps as surprised as I was to learn that 85 percent of the traffic load at Adelaide Radio is CW or MCW! (MCW is modulated CW, where Morse code is sent using a modulated carrier so that equipment without BFOs; eg AM-only, can receive it). This says two things to me — first, CW is far from dead in the maritime communications field, and second, the CRS constitutes one of the few remaining professional Morse operations in the world. With the dependence on CW and the necessity of handling unscheduled operations with a variety of stations, it is more like amateur radio than any other communication field.

As you are probably aware, the primary role of the Overseas Telecommunications Commission is the operation of commercial communications services (telegrams, telephone, telex, facsimile) between Australia and other countries. It operates in parallel with *Telecom Australia* which has the responsibility for domestic communications. It follows that commercial traffic is the primary role of the Coast Radio Stations, but you will be pleased to know that all of the operators and staff regard Maritime Safety as their primary mission, and commercial traffic as secondary.

Adelaide Radio has two operators on duty during the day, and one at night, and all emergency channels are monitored. The area of responsibility extends from the mid-point between Melbourne and Adelaide to half-way across the Great Australian Bight, and there is some overlap with neighbouring CRS stations, 15 of which effectively ring Australia and provide 24-hour communications with ships at sea. Thus the CRS is usually the first to hear of any maritime emergency, and liaises closely with local Coastguards, Police, and the national search and rescue centre in Canberra.

In its commercial role, a CRS station can connect any ship at sea within its area of coverage with any person who can be reached by telephone, telegraph, or telex anywhere in the world.

The equipment necessary for Adelaide Radio's mission would bring tears to any amateur's eyes. Given top-line receivers for MF, HF, and VHF, the transmitting power available to the single nighttime operator is pretty impressive. There is a 2 kW transmitter on MF, and three 1 kW, fully synthesised transmitters on HF.

Maybe that does not sound like a lot of power (after all, 3 kW linears on the amateur bands are available overseas) but when you put a kilowatt into a CRS antenna it definitely gets radiated. The Adelaide Radio antenna farm covers 66 acres. It is a lot of real estate. There is wire everywhere, strung from seven 70 foot (20 metre) towers, and in the middle of it all is a 150 foot (46 metre) insulated, top-loaded tower which is itself the MF vertical radiator.

The other antennas comprise fans, folded dipoles, and cage quads. There is a copper earth mat 12 inches (30 cm) below the surface of the entire area, and you can imagine the amusement of the staff at the station when a state electrical authority inspector complained that the 240 volt service was "inadequately earthed." And to top it all off, there are legal constraints against anyone building anything in the vicinity of the station, which is in farmland separated by hills from Adelaide, so there are no problems with RFI.

In case the 240 volts supply fails a diesel generator can supply adequate power for sustained operation at full power. It is the size of a small car, and if it were a little more portable, I think it would go well in the John Moyle!

The 600 ohm transmission lines run from the station to separate receiver and transmitter gantries, where baluns match them to 70 ohm coaxial cable for the rest of the distance (.8 km in the case of the receiving antennas).

All in all, Adelaide Radio is admirably located and equipped to fulfill its mission. The only negative aspects were from the operator's standpoint, with fairly "antique" consoles, and the very common problem of having to upgrade technologies to support computers, satellites and so on. But the main thing is that they are there; they make some traffic money for OTC, but far more importantly, they provide a lifeline for all the ships at sea.

CU next month.

Club Corner

GIPPSLAND GATE RADIO AND ELECTRONICS CLUB

The Gippsland Gate Radio Club has been the focal point of amateur radio activity in and around Dandenong, Victoria, for the past decade. In June 1986, there were some changes made within the Club and it is now known as the Gippsland Gate Radio and Electronics Club.

The original aims of promoting amateur radio communications are still maintained, but they now include the fields of Digital Electronics, Kit Building and Computers.

The GGREC is a group of electronic enthusiasts and radio amateur operators who promote all aspects of computers, hobby electronics and telecommunications. The Club features its own amateur radio station, a test equipment library and component sales to its members.

Monthly meetings are open to all ages and visitors are made most welcome. Meetings are held at 8 pm on the third Friday of each month at the 1st Oakwood Park Scout Hall, in Heyington Crescent, Dandenong.

Inquiries about the Club may be made to GGREC, PO Box 98, Dandenong, Vic. 3175.

—Contributed by Ian Johnson VK3BUF

DEVIL NEWS from the North-West

There were 23 members and three visitors in attendance at the last meeting. Apologies were received from VK7s SE, OL, SF and Athol Gill.

Letters of thanks were read from the Boys Brigade, Apex and the Horse Trials at Ulverstone, for the communications help given to them by the Club.

Several items were tabled for discussion, one of them being Camp Quality. After much discussion it was decided to use the club call sign VK7NW, for the camp station. Operations from Camp Quality will be from a caravan.

The QSL Bureau had another quiet month with very few cards being processed.

The committee have started thinking about the Hamfest which will be held on the North-West Coast.

A WICEN exercise will be held next year in conjunction with an air pageant at Wynyard. This has the makings of a very interesting exercise.

A warm welcome is extended to Malcom Prisstley, whose membership application was accepted at the meeting.

The meeting concluded with a successful auction of radio discards. Everyone managed to purchase something they *did not* want, thanks to a good auctioneer!

The RAD repeater will shortly be installed on top of Mount Duncan. A working party has already made the arduous climb to install the housing for it on August 10. The party consisted of VK7s ZAP, ZHA, AX, WP, WN, OM, ZBT, and WJ, with Andrew VK7ZAP, in charge.

They assembled at the Penguin High School at around 9.45 am and proceeded to the walking track in four wheel drives and a utility. A variety of materials were then transported to the peak via the backs or hands of the party. Ross VK7WP and Noel VK7NW carried the large and bulky steel housing for most of the trek.

Approximately two and a half hours were spent working on and inspecting the equipment already at the site.

The hardy adventurers had an eventful trip back down the mountain due to two trekkers taking a wrong path halfway down and proceeding for some distance before realising their error. At the base another two headed in the wrong direction in a four wheel drive but were able to find their way eventually.

—Notes compiled by Max Hardstaff VK7KY and Greg Stammers VK7ZBT

WAGGA CONVENTION

As mentioned last month, the Wagga Wagga Convention is to be held over the weekend, October 25 and 26, 1986. It is expected to be an interesting and rewarding weekend for all who attend.

The program commences early on Saturday with displays, fox and hidden transmitter hunts, vintage equipment for sale, steam engines and trade displays. There will be attractions to interest amateurs, SWLs, hobbyists and family members. Several of the leading equipment suppliers have booked stands and shall be displaying the most modern equipment available today.

Demonstrations of Packet Radio, Satellite TVRO, AUSSAT, ATV, and RTTY have been arranged and it is hoped to have people in attendance who will be able to give information and answer questions on the various aspects of each display.

The Conference Dinner will be held on Saturday evening. This year, the guest speaker for the evening will be Roger Harrison VK2ZTB. A private room has been reserved at a local club for the dinner, cost is $14 per head. Bookings are required early to ensure a vacancy. Bookings close on the Wednesday prior to the convention. Cheques should be forwarded to PO Box 294, Wagga Wagga, NSW. 2650. Late bookings or inquiries to Kevin Cox VK2ZKV, (069) 26 1284 or Peter Clee VK2KZZ, (069) 26 1532.

Events and activities will continue on the Sunday with prize giving and closure timed early to allow for those who have to travel long distances on the homeward journey.

Accommodation, on site, is available in bunks, or tent and caravan sites. This is available free of charge but reservation will be on a first come basis and payment of the registration fee. A limited number of bunks and sites are available.

Accommodation is also available in many of the numerous motels in Wagga Wagga. A number of motel units have been booked at this time, however, it is not foreseen that there should be any shortage of this type of accommodation. Reservations can be made by contacting Peter or Kevin. A special price will be available at selected motels.

Tours of the city and local attractions have been arranged for those not as keen on the amateur radio side of things. Shops in Wagga are all open on Saturday mornings until 12.00 noon, and many remain open to 4.00 pm.

Registration fee will be $10 per participant or family registration. The site for the convention is OURA, located 10 kilometres from Wagga Wagga. Communications on the day will be via repeaters 146.750, 438.675 MHz, or on HF 3.613, 7.165 or 28.490 MHz.

The club holds a regular sched on 7.165 MHz at midday on Sundays. More information may be obtained, if required, at that time.

—Peter Clee VK2KZZ, Publicity Officer, Wagga Convention

WESTERN AND NORTHERN SUBURBS ARC Inc

The Western and Northern Suburbs Amateur Radio Club Incorporated, (previously the Western Suburbs Radio Club) holds its general meetings at 8 pm, on the first Friday each month at the Ern Rose Memorial Pavilion, Seaver Grove, Reservoir.

Club nets are held each Tuesday on 145.450 MHz FM at 0930 and on 28.470 MHz USB at 1030 UTC. VK3IYP (International Year of Peace) is the CLub call sign for 1986.

Officer Bearers for 1986 are:
President: Mark Stephenson VK3PI
Vice-President: Stan Taylor VK3DHN
Treasurer: Gordon Hall VK3YOD

—Submitted by Tom Page VK3AGH, Secretary

FAX FACTS

Demand for facsimile machines in Australia continues to rise and is expected to reach 30 000 in use this year and an estimated 100 000 by 1990.

Industry sources say businesses are rapidly recognising that FAC provides an inexpensive and quick means of document exchange. It takes 30 seconds to send an A4 document by FAX for the cost of a local call, or STD for long distance, compared with Telex taking five minutes at a cost of $2.

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PARRAMATTA, NSW. 2150
(109 Wigram Street, Parramatta)
Phone: (02) 689 2417
11 am to 2 pm M to F and 7 to 9 pm Wed

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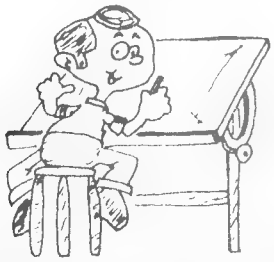
CLUB PORTRAIT

NORTH EAST RADIO GROUP

Jim Linton VK3PC
4 Ansett Crescent, Forest Hill, Vic. 3131



The key elements of the North East Radio Group (NERG) are cheek, friendliness, activity and success. It is based in Melbourne's north- east suburbs, filling the geographic need for a radio club in the area.

NERG began when a number of radio amateurs, going to the annual Queen's Birthday Weekend Mount Gambier Radio Convention, in 1983, decided to form a club with the pure aim of winning the Convention's inaugural trophy.

The founders of the Group include Greg Williams VK3VT, Ewen Templeton VK3BMV, Paul and Brenda McMahon VK3DIP and VK3QT, Geoff Hudson VK3CGH, Ian Bryce VK3BRY, Greg Ahpee VK3BZQ, Gary Carlson VK3KBL, John and Victoria Griffin VK3ZGT and VK3BNK, and Hank De Jong VK3BLI.

Along with their blatant, premeditated scramble for club status, they had the cheek to pick a name not unlike the Convention's host club, the South East Radio Group (SERG).

NERG Secretary, Greg VK3VT says: "It was a stir to the SERG — there's certainly a friendly rivalry between the two groups now."

NERG won the Mount Gambier Convention Club Trophy in 1983, and again in 1984 — then SERG dropped it from their program! The Club Trophy was awarded to the club with the highest overall points score in normal events being held, plus two others — antenna raising and a wheelbarrow race.

NERG's winning streak continued at Mount Gambier with Greg VK3VT, winning the overall individual points score in 1985 and Richard VK3CRH/7CG, the 1986 winner.

The Group's other successes include the John Moyle Memorial Field Day Contest, which it first entered in 1984 to be runners-up, but in each year since has been section winner — and top scorer in 1986.

NERG club meetings began in the Montmorency High School in 1983. An attempt is made to keep administration low and activity high — and stay a friendly club.

The NERG attempted to work the Astro-Amateur, Owen Garriot W5LFL, in December 1983, only to be disappointed. They then produced an Owen Garriot dummy and publicised through the VK3BWI Broadcast for anyone who missed the Astro-Amateur to come to a NERG meeting and shake the dummy's hand.

Occasionally NERG has a construction night when they get someone who has made a particular item to come along and show everyone else.

The Victorian Fox-hunt Champion for the past eight years has been a NERG member and it has been said that NERGs are Australia's supremos of Direction Finding. The Group hold quarterly Sunday Afternoon Fox-hunts, mainly on HF, for those who want to get their feet wet in DFing. However, one readily suspects they use these trials to keep up their level of skill!

Planning is advanced for the 1987 Victorian Fox-hunt Championships, in February, which the Group says it is again organising to find the top Victorian Fox-hunter and to have a good time.

Novices classes were started in 1984, because the Group felt there was a need in that area and to simply promote amateur radio. The classes produced seven novices, and therefore seven new members in the first year, and there is a class of five in 1986.

Promoting the hobby is something the NERG do well and it has been the only club to volunteer and operate the Science Museum Demonstration Station, VK3AOM, on a regular basis.

One thing about the Nerg's 50 members is that most are active in club affairs, and are not just on the books as financial members.

Their approach to JOTA is somewhat unique. It set up a number of booths containing activities such as direction finding, sniffer hunting, radio teletype, HF operating and Morse code. The idea is for each booth (event) points are awarded and the top scoring scout troop wins the award for the day. This way, they learn a little more about amateur radio than just operating a microphone.

The Group was incorporated in 1985 due to the need to be a legal entity to enter into a lease agreement for a tower.

The NERG is moving quickly to establish its six metre repeater, VK3RMH, at Wattle Glen, as there are a number of six metre operators within the Group and it is hoped that the repeater will encourage use of the band.

And, what about the Group's emblem? Greg says: "We all think that's what a NERG would look like — a nice cuddly character who is fun to be with."

The Group, heard on air as VK3CNE, also issues a bimonthly newsletter *NERG News* to keep its members informed.

For further information contact NERG, PO Box 270, Greensborough, Vic. 3088 or phone Greg Williams VK3VT, (03) 606 7478 BH or (03) 435 7870 AH.

WANTED

Any "RARE" recordings of amateur radio contacts for Volume 2 of "THE SOUNDS OF AMATEUR RADIO."

We are particularly interested in recordings of contacts on bands not now available to Australian amateurs; eg 112 MHz, 288 MHz, etc. We are also looking for recordings of unusual contacts; eg from Balloons, Aircraft, Submarines, etc.

Any recording format can be handled from cylinders to CD.

In the first instance please write to:
PETER WOLFENDEN VK3KAU
c/- FEDERAL OFFICE
PO BOX 300
CAULFIELD SOUTH VIC 3162.

PLEASE DO NOT SEND RECORDINGS.

Copies of Volume 1 "THE SOUNDS OF AMATEUR RADIO" are still available for $7.00, plus post and packaging.

Inquire at your Divisional Bookshop or the Federal Office.

QSP

SUPER-MAGNET MAKES SMALLER MOTORS

An essential component of many motors is the large, heavy permanent magnet associated with the non-excited elements of the motor. *Magnequench*, a new product developed by General Motors, is about 25 percent stronger than any other known magnetic material.

Currently, the most widely used high-power magnets, composed of samarium- cobalt, are expensive and difficult to manufacture. But the new material is so low in cost that the auto-maker plans to use the material on starter motors in some cars. Only five ounces of the material are needed for the newly designed motors.

This tremendous saving in weight and size offers several benefits. Using a smaller, lighter starter, for example, simplifies design of the engine area. Using *Magnequench* instead of conventional magnets in all the control motors of a car would presumably produce a measurable effect on fuel economy as well.

Because samarium-cobalt is the material sometimes used to make very small, high-performance loudspeakers, it should be interesting to see if the speakers manufacturers put in our HTs get any better as supermagnets become more widely available.

—Reprinted from *ham radio* July 1986

VK2 Mini-Bulletin

Tim Mills VK2ZTM
VK2 MINI BULLETIN EDITOR
Box 1066, Parramatta, NSW. 2150

DIVISIONAL NEWS

A vacancy has occurred on the Divisional Council. Mary Jane Douglas VK2CMJ, has married and now lives in the country near Coonamble. The distance made it difficult to carry out her council duties. Best wishes and thanks to Mary Jane for the future. . . .The 'Broadcast Survey' has been completed and a review given over the broadcasts. A written report will be included in a future *Minibulletin*. . . .The call sign VK2AWI is to be reactiviated and will be used to provide identification for operation from Amateur Radio House. . . .Scheduled activities in this coming month include the Divisional Dinner on Saturday, October 11, if the minimum booking level has been reached. Details have been given on the Broadcasts and last minute information may be obtained from the office during the hours 11 am to 2 pm weekdays or on Wednesday evenings 7 to 9 pm. Telephone (02) 689 2417. . . .Members are reminded that the latest Australian Call Book is available from the office, together with a range of amateur publications. Regrettably, the cost of the overseas publications has risen. . . .A reminder that JOTA will be held over the weekend October 18 and 19. Contact your local group or the Divisional Office if you can assist. VK2WI will rebroadcast the opening address from Canberra at 2 pm Saturday, if we are able to receive a strong signal to do so. . . .The next Conference of Clubs will be held on Sunday, November 2.

It was with regret that we learned of the passing, after a short illness in early August, of Brian Lavery, husband of our Administrative Secretary, Maureen. To Maureen and her family we extend our sympathy on behalf of all members.

WICEN

This month there is the annual operation to provide safety communications to the Canoe Classic, conducted on the Hawkesbury River over the weekend of October 18 and 19. . . .During this past year, the WICEN repeaters VK2RWS have undergone an extensive rebuild on the two metre side. New antennas have been installed and it is hoped that the original service area has been restored. . . .The postal address for WICEN is via PO Box 123, St Leonards, NSW. 2065, or mail may be left at the office for redirection.

DAYLIGHT SAVING

A reminder that, with the change to daylight saving later this month, the VK2WI Broadcasts observe local time — that is 11 am and 7.30 pm. The VK2TTY RTTY and VK2BWI Slow Morse practice will observe UTC time. Their transmissions will shift one hour by local time!

NEW MEMBERS FOR AUGUST

A warm welcome is extended to the following amateurs who were admitted to membership at the August Council Meeting:

N J Coleman VK2KJZ, North Sydney; R M Ellis VK2PGG, Lane Cove; L N Lindsay VK2CLL, Wauchope; C L McPherson VK2CLM, Port Macquarie; H M Pieremont VK2APD, North Epping; J B Robson VK2VUL, Edenson Park; J Sproule VK2XJS, St Ives.

SOUTH WEST ZONE CONVENTION

The Wagga Amateur Radio Club advise that the Annual SWZ Field Day will be held at the same venue as last year, at the Scout Camp near Wagga, over the weekend October 25 and 26. Further details may be obtained from WARC, PO Box 294, Wagga, NSW. 2650, or via the Sunday Morning Broadcasts.

While on Field Day dates, mark the Central Coast 1987 event for Sunday, February 22. This will be the 30th Annual Field Day on the Central Coast. The CCARC may be contacted at PO Box 238, Gosford, NSW. 2250.

PUBLIC LIABILITY INSURANCE FOR CLUBS

These notes were prepared in mid-August and at that time the interest and response to the proposed scheme had been poor.

VK2 DIVISIONAL LIBRARY

Aub VK2AXT, the Divisional Librarian, would like to thank the following for their donation of books and magazines:

VK2s OZ; NL; JTR; YTQ; CQ; KYS; AUE and LW.

Special thanks to Mrs Court and Mrs Garland, for the donations of books from their late husbands to the library.

A recent addition to the library is a listing of current equipment modifications, surplus equipment modifications and circuit information which is covered in amateur magazines. In addition, a list of instruction and overhaul manuals which the library holds for commercial and wartime surplus disposals equipment.

This information is in a red covered folder on the QSL cabinet. If you intend purchasing a piece of equipment and would like to survey its performance data, call into the Parramatta office and look up the reference. Alternatively, you can ring (02) 689 2417 on either Tuesday when Aub is in attendance or on Wednesday evening when there is a Councillor on duty to ascertain if the review and/or the modification can be supplied.

The library cross-reference indexing which categorises articles appearing in amateur magazines into their respective group headings is currently being revised. This amendment covers all the articles appearing in the last 12 months of the various magazines.

The listing covering the library contents is also being progressively updated, with almost all the books now in the list. The popular magazines are now listed, but some of the rare and old issues are still being audited and listed.

The library has a comprehensive coverage of amateur books, electronic and computer magazines for your use. This coverage has been achieved by the many generous donations received, but to keep abreast of technology, there is still a need for books covering solid-state devices, application notes and technical books — new and old. The Librarian and Council is very appreciative of those who think of the library when disposing of unwanted literature and especially members who have the unpleasant task of disposing of the estate of a silent key.

This has been my mid-year report. If you have any request we will do out best to supply the data you request.

—73 Aub Topp VK2AXT — Divisional Librarian

A new service for members, which is being added to the library facilities, is a photocopying service for some of the data books. The details are still being worked out, but in essence it will be only by mail since the material has to be located and processed.

Limit of three items and you will need to cover the cost of return postage. By the time these notes appear, the conditions will be known. A copy may be obtained from the office or if you send in a SAE, a copy will be sent.

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VK4 WIA Notes

Bud Pounsett VK4QY
Box 638, GPO, Brisbane, Qld. 4001

It is inevitable that regular nets held by clubs or a wide flung group of individuals and conducted on HF, will run into interference problems. The ideal place for nets is, of course, VHF and particularly, the two metre band. This automatically prevents novices from joining in and, in a very large state like Queensland, limits the participants to those in a relatively small area. So it is back to HF with the popular choice being 80 metres.

Let us consider some practicalities. To start a net, we must set a time, that is, a particular day and time. We must choose a frequency and then publicise that frequency. Having told everyone that this is the frequency on which to meet, we are stuck with it, plus or minus a few kilohertz.

The time comes and there is the frequency — occupied! What to do? You can move up or down a little or you can ask the occupants to shift. Remember that this is **not** your frequency, so remembering this, you ask, in the most polite terms, for the occupants to shift and most times they will. If they refuse, drop the matter forthwith.

On the other side of the fence, if you are on a publicised net frequency at net time and are asked to move politely, consider the foregoing and be aware of the net controller's predicament. By moving you will be showing the true amateur spirit.

In Queensland, a favourite net frequency and one of our VK4WIA broadcast frequencies is 3.605 MHz. Here is a short list of nets and times when they are on, and as the phone-patch Americans used to say, a clear frequency would be appreciated.

VK4 Disabled Persons Radio Club — Fridays, 0930 UTC on 3.590 MHz.
Gladstone Amateur Radio Club — Thursdays, 0930 UTC on 3.570 MHz.
Townsville Amateur Radio Club — Sundays, 0930 UTC on 3.605.4 MHz.
Queensland Club Net — Tuesdays, 0930 UTC on 3.605 MHz.
Queensland Net — Thursdays, 0930 UTC on 3.605 MHz.
VK4WIA News Re-Broadcast — Mondays, 0930 UTC on 3.605 MHz.
Gold Coast Amateur Radio Society — Wednesdays, 0930 UTC on 3.605 MHz.

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VK3 WIA Notes

NEW MEMBERS

A warm welcome is extended to the following:

Alan Bergman VK3CHX; A B Burgess VK3PKA; Tony Capuano VK3NTC; Geoffrey Chamberlain VK3AZI; Dudley Hart VK3PDH; Brian Keegan VK3CTT/VK3KPB; I J Stanley VK3CIS; Ian Stowe; George Strachan VK3HS and Brian Hallam VK3DBH.

ILLEGAL RADAR

Components for a device to jam police radar speed guns are being sold in Melbourne and an American car magazine is offering mail order plans for a jammer.

Use of these devices could, under the Radiocommunications Act, result in fines up to $10 000, five years imprisonment, or both.

Five-Eighth Wave

Jennifer Warrington VK5ANW
59 Albert Street, Clarence Gardens, SA. 5039

One of the "perks" of being President is being invited to visit some of the various affiliated clubs at their monthly meetings. Over the past couple of months, I have enjoyed meeting the SA ATV Group at their visit to the Educational Multi-Media Department, and the Adelaide Hills Amateur Radio Society at their *Buy and Sell Night* (from which I returned with a car load of 'bargains' and a several of centimetres added to my waist-line from the beautiful supper the ladies provided!).

More recently, I was invited to attend the Elizabeth ARC's AGM to chair their Election of Officers, and to draw their raffle. It was an "appalling" night (weather-wise) but inside the Water Tower on Kettering Road, the atmosphere was warm and friendly. The new committee of this small, but very keen group, are as follows:

President: Trevor Lowe VK5ZTJ
Secretary: Eddie Jennings
Treasurer: Vince Schwinger VK5ZSV

and the Committee Members — Sean Quigley VK5KSQ, John Cooper, and Rex Haskard VK5HO.

Yet another magnificent supper (more centimetres!) was provided by Hannah Jennings, Eddie's wife. If you live in the Elizabeth area (or even if you do not) and would like to join a friendly group, drop in at the Water Tower (Kettering Road, opposite GMH) any Wednesday night from 7.30 pm for general activities, or the first Saturday in the month for a meeting night, also from 7.30 pm. I can assure you that you will b made most welcome.

WOULD HAVE LIKED TO VISIT

One Club that I would have liked to visit in mid-Winter (although I understand that even they did not completely escape the cold weather), was Darwin. They also have a new committee comprising:

President: Bill VK8ZWM (better known, perhaps, as 'Spud', who I am told left immediately for VK4. Was it for advice or is the job really that bad, Henry?).
The Vice-President is Barry VK8DI, (who shortly afterwards was seen in Adelaide!). All jokes aside, we were pleased to have you and your father with us at the *Buy and Sell Night*, Barry.
Secretary: Larry VK8LM
Treasurer: Trevor VK8CO
Station Manager: Frank VK8FT

One member who will be sorely missed, but must deserve a well-earned rest, is Henry VK8HA. You may remember that Henry was awarded a 75th Medallion for his services to amateur radio in Darwin last year, and now, as he leaves the Committee, he has been awarded the first Honorary Life Membership ever to be given by the Club.

The Club will be 20 years old in November, and Henry has served on the Committee for at least 15 of those years, not only doing the job of President, but at the same time being the QSL Bureau Manager, the Intruder Watch Co-ordinator, one of the Sunday Morning Broadcast relay operators (every week), Slow Morse Practice Operator (almost every night!), Journal (Ground Wave) deliverer/postman ... what more can I say? Congratulations Henry, you deserve it.

WHY NOT COME UP?

At this years Clubs' Convention, the Lower Eyre Peninsula ARC put forward a proposal that the frequency 3.579 MHz should be designated a "Home-Brew" frequency. We felt that although it was an interesting concept, it was not possible to make it 'mandatory' but that it should be publicised and encouraged (my apologies for having taken so long) so, you Home-Brew enthusiasts, I understand that the crystals for this frequency are readily available, so why not come up and give each other a but of encouragement.

By the time you read this it will hardly be news, but on behalf of the Divisional Council and Members, I would like to thank Arthur Tanner VK5AAR, for volunteering to take over the job of Broadcast Producer. Each person brings to the job his or her own personality and no two are ever the same, so we look forward with interest to Arthur's style of production.

OCTOBER MEETING

It has been suggested that the meeting on October 28, be one with a historical theme, and to this end it is suggested that you bring along your favourite piece of "olden day" gear (if you have one) and be prepared so say a few words about it. Also, at the June meeting, our Historian, Ray Bennett VK5RM, promised to return with a list of the "Duties of a Historian" which were discussed at that meeting. So, here is his 'compilation' and it is suggested that you bring this list with you to the October meeting to discuss it further with Ray.

POSSIBLE ACTIVITIES OF AN HISTORIAN
(South Australian Division of the WIA)

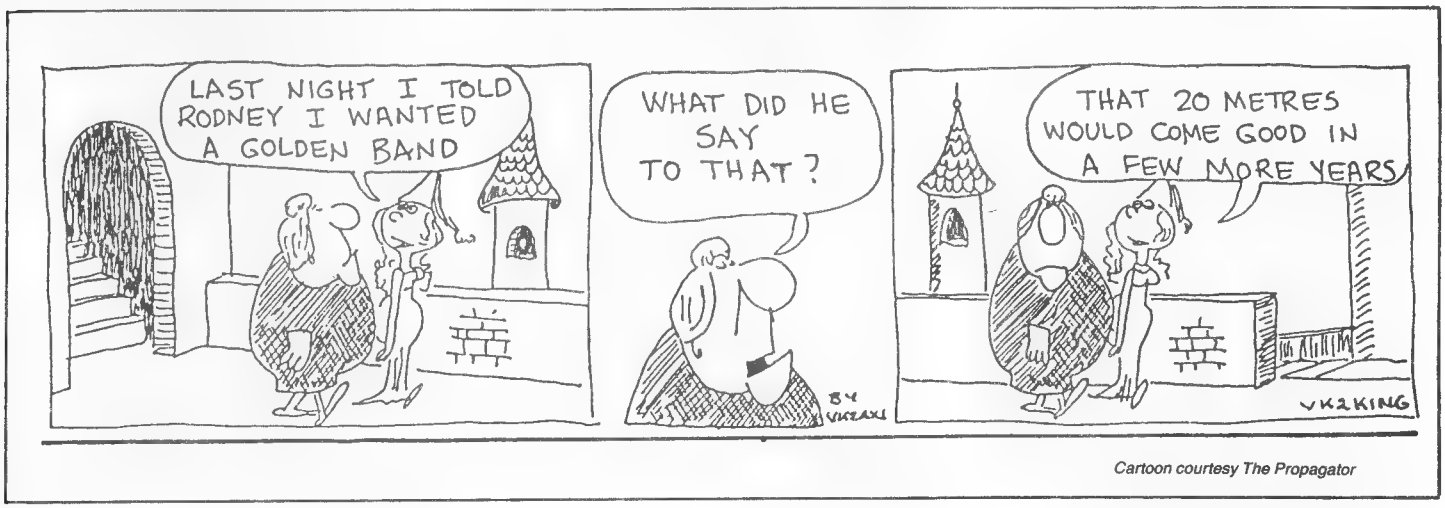
1. To accurately record for future reference those achievements in the art of amateur radio made by members of this Division, in the fields of VHF, DX, ATV, etc, etc.
2. To prepare any publication or publications of an historical nature which may be of assistance and interest to members of this Division.
3. To bring such material as in 2 to the notice of members for their attention.
4. To record any section of the material referred to, for future reference.
5. To assist other Officers of this Division where inquiries of a historical nature are required concerning activities of members in the developments of amateur radio.
6. To prepare a short lecture for a selected monthly meeting, or whatever, if requested.
7. To assist officers and members of this Division in 'Spreading the Gospel' of amateur radio as a worthwhile hobby.
8. To assist the Historian/s of the other Divisions — or the Federal Body — in compilation of material, if requested.

—Compiled by Ray Bennett VK5RM
Divisional Historian VK5

JUBILEE 150 AWARDS

354	VK6XC	442	K4BZV
355	VK3KJI	443	K4VPS
356	WA0GUD	444	KB2ACQ
357	VK3DME	445	WD9FEN
360	VK2EKO	446	KA8KEF
361	ZS4TV	447	AA4JO
362	VK2BHC	448	KA2TFM
367	VK5ASQ	449	KD5F
368	L50126	450	NG8Y
369	VK3DYL	451	K3ZPG
370	VK5NFK	452	KB8XT
373	VK2JGR	453	N6KGC
376	VK7BD	454	N3FAS
382	VK3KRL	455	W3IPY
386	N7DLJ	456	WA4QMQ
387	VK6NPZ	457	N8BEE
388	VK5KPJ*	458	KA0TWR
389	VK3NTC	459	W3AEC
409	KB5RF	460	K7DWT
410	WD5DOA	461	KA6IWW
411	N4NTN	462	K9GBN
412	W6EFR	463	KA7PPH
413	KA7APJ	464	KA7QBF
414	KB6GOZ/MM KL7**	465	KB6JXQ
415	N5HNS	466	KA7GJR
416	NJ9R	467	KB6DQ
420	KA7VJQ	468	KC5KW
426	N3ETZ	469	KA0UMJ
427	WA1FSD	470	K1ZZI
428	KC9YM	471	W8ATX
429	WA6HEX	472	KA0IVB
430	KB6JRI	473	KB9YY
431	WA5SWV	474	N5DER
432	KA9KHQ	475	K8MDU
433	KA0DFN	476	WA8URR
434	NC9I	477	KB1WR
435	W9IH	478	KA1DNB
436	KA0HSC	479	KY9D
437	WA9OAS	480	N6BSA
438	W7IOS	481	KA7DXU
439	KC7VG	482	N5FHR
440	K6OZV	483	N5GIW
441	K4CCV	484	N4HDT

** denotes first on ATV*
*** denotes first /MM*



Cartoon courtesy The Propagator

Over to You!

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publisher.

APPRECIATION FROM CHINA

The copy of *Amateur Radio* magazine received recently with the detailed article, *Introducing BY4 Able Old Men*, page 30, AR May 1986, sure put a tan on my cheeks. Anyone who might read the introduction would certainly have a complete picture of BY4AOM.

A personal visit to the station would not add much more information.

When I passed the article around to all the Old Timers, they gave a positive response and expressed their appreciation for the help in telling our old and new amateur friends that China's Old Timer Amateur Operators are still going strong and are back on the air again with an ever improving kick.

With the help of our old friend, Tom Wong VE7BC, we are putting together a linear amplifier with a two kilowatt input power. And if everything goes well, BY4AOM will be easier to copy in "the remotest corners of the world" we hope.

The band conditions these few months have not been very good for DX from our location. We could hardly hear any VK-land stations recently and the Stateside stations came in with a 5 x 3 signal and only around 0300 UTC, which is not a very good time for both sides.

73,

John Cieh,
Chief Operator of BY4AOM,
PO Box 227,
Shanghai, China.

REEDMAN FUND

The Denis Reedman Fund has now been wound up and the following information is published for the benefit of members and donors.

Total Donations Received	$3702.59
Less Bank Charges, Stationery and Postage	$114.07
Balance	$3588.52
Cheque to Denis Reedman	$3578.20
Cheque to Salvation Army	$10.32

The amount paid to Denis covers his direct legal costs in full.

A big *thank you* to all who contributed collectively and individually to this appeal.

Sincerely,

Ron Swallow,
Greg Morrison,
Col Davidson VK2JCO,
PO Box 48,
Gladesville, NSW.

FOR THE FIRST TIME

I recently took part in the 1986 Remembrance Day Contest. It was the first time for me as I had my licence for less than a year. The contest as a whole was a very enjoyable experience for me from start to finish.

My operating was confined to the two metre band as that is all I have equipment for and my efforts were rewarded by 175 contacts. While this may not sound like many, my time was divided between operating my own station and assisting the operation of a local radio club station.

For me, there was only one disappointment, the low number of operators actually participating in the contest. For example, the July 1986 edition of AR gives the number of limited call sign holders in VK6 as 216. Including myself, I heard only 10 of these operators on the two metre band.

A quick look at the VK6 Z-calls in the 1985-86 Call Book shows an overwhelming majority of these operators live in the Perth metropolitan area, thus making them quite accessible on two metres. If 50 percent of these people made the effort and took part in the contest there would be no need for the "work you again in two hours" clause in the rules as there would be more than enough stations on the band to enable anyone to fill a decent log in a matter of a couple of hours.

Incidentally, the number of unrestricted operators heard on two metres was equally disappointing, but at least they had the excuse that they were operating on the HF bands. *Or were they?*

The RD Contest would have to be the easiest and most enjoyable on the contest calendar. It certainly gets adequate publicity — so how about it folks — next year just spend five minutes on the air and work your minimum of 10 stations and who knows, you may find yourself enjoying it.

Just call CQ-RD and I will give you a number and so will all the others who took part this year, I am sure.

Alek Petkovic VK6ZAP,
26 Freeman Way,
Marmion, WA. 6020.

AUSTRALIAN RADIO HANDBOOK

I am in complete agreement with Drew Diamond as to the need for a truly Australian Radio Handbook which would cater for the needs of VK amateurs. Hopefully any constructional projects included in such a handbook would specify components which can be obtained in this country within reasonable limits.

I am sure there are many radio amateurs who are discouraged from venturing into home-brewing of instruments and equipment because of the difficulty in obtaining the components as specified in many overseas projects.

Also, with the increasingly high cost of equipment we could quite conceivably see a return to home construction of basic transceivers, particularly if good designs and instruction were available.

I would like to see other amateurs derive as much enjoyment from this facet of the hobby as I do and I think more local content is required to encourage and foster interest in home construction.

I would definitely buy a copy of such a handbook, if it became available and I hope the response to this suggestion is sufficient to encourage publication of such an Australian Radio Handbook.

Cordially yours,

Rob Abel VK2ERA,
106 Derwent Street,
Glebe, NSW. 2037.

HELP REQUIRED

Three small items that I would like to comment on.

First, the standard of AR is very good. You are doing a fine job and I like the paper quality.

Second, in answer to the letter from Drew Diamond. Please register me as a purchaser of a technical book if it is published.

Thirdly, I find difficulty in defining when the Australian prefix changed on three occasions.

When I was first licensed in 1925 as 2JA, somehow I knew the prefix was A; ie A2JA. Then on the grapevine, because I am sure that I didn't get notification, I became OA2JA. Then it became VK2JA, but I see many conflicts in the use of the three prefixes and I wonder if anyone knows exactly when the A first come in and then the OA and later VK. I am very curious about it.

73,

Arthur Mead VK2JM.
13 Salisbury Avenue,
Bexley, NSW. 2207.

Can someone help Arthur, please. — Ed

A letter has also been received from Mrs T M Brown VK3DYF expressing interest in an Australian Technical Handbook.

HALLEY'S COMET

I forgot to write, after seeing the QSP about Halley's Comet in June AR, but would like to record my recollections of seeing the Comet.

I was just three, in May 1910, when my Mother took me downstairs into the yard on a cold, clear morning to see Halley's Comet. We had a clear view to the north-east and the Comet appeared to fill the sky.

The tail streamed out behind it as I remember on that date. Some may doubt that a three-year-old would remember it at all. I have had a standing joke with my friends for 50 years "that I want to live until 1986 and see Halley's Comet again."

Well, I did, and this time I saw it 13 times — ten from my home address with binoculars (7 x 50) and the others when I went on a bus tour in western New South Wales to Coonabarabran, Jilgandra, Narrabri, and Parkes. Two places had optical telescopes.

I believe the next sighting in 76 years will be a super-flop, but just wait another 76 years and it will be a "boomer!"

Arthur Mead VK2JM.
13 Salisbury Avenue,
Bexley, NSW. 2207.

REGULAR CONTACTS WANTED

I am interested in setting up regular scheds with an Australian amateur. I only have 80 watts and no beam antenna, so a regular sched would be my chance for something more than a brief DX-type QSO.

I am very interested in learning more about Australia and it's people.

My QTH is Spokane, Washington and I am married and 30-years-old.

73,

Gary Stone KA7YXC,
East 603 Empire,
Spokane, Washington, 99207, USA.

EGO BOOSTING

I am continually surprised by some people, knowing little and saying much, who push themselves to the fore to boost their egos, unaware it has all been done before.

A prime example was the letter in July *Amateur Radio* headed "Emergency! Are we ready?" Yes, Sam, we are ready and have been for many years. It seems that you are deliberately ignoring past history, both internally and internationally. We have always been able to handle emergencies as they have occurred. America certainly has never, as yet, played a vital part in any of our radio communications emergencies, so talking of America's vital role in Australia's emergencies is hog wash!

It seems that the expertise involved is of very low level. It clutters up two frequencies to pass traffic, when only one frequency should be used. Then the complaint about conditions, oh come on, all day every day? Sam really must have a poor receiver. Some stations, myself included, communicate with the USA and other overseas stations daily. But then, of course, we are not black box operators!

Regarding the Mexico City disaster, whilst appreciating the work involved in passing 600 messages via the telephone to the United States, I deplore the lack of expertise which necessitated this action. During that emergency I was in touch with my friends in Mexico City via Radio Teletype and AMTOR 16 times. I did not rush to the Mexican Embassy and fall over myself to offer my services. Nor did I use the telephone to get my traffic through. I used my radio as any experienced amateur would do.

Further, I see that Sam is going to start a "mail drop," whatever that is? I presume he means mailbox. That is interesting, are mailboxes and AMTOR something new? Maybe for him, but then he has only recently purchased his black box. Others do keep up with the state-of-the-art, and have been using AMTOR for the past five years. There has been a mailbox available for the last four years. It works very well, gives world-wide coverage, and is based in northern New South

Wales. Why have a proliferation of mailboxes, especially when the operator has no idea of how it is supposed to work, nor of the protocol of the system?

There is already a mailbox within 2 kHz of Sam's proposed 7 MHz frequency. Sam will succeed only in creating havoc on the bands. It is a pity that amateur radio has descended to a level where black box operators can write such inane letters.

It would be much better if such people inquired about what has gone before and modelled themselves upon some of the "old-timers" who really knew what radio was all about. It would do them good to discuss communications and other matters with those who have experience and expertise. They must realise that many people know more than they do, are worth listening to, and willing to help others.

So to the Sams of this world, please make sure you know what you are doing to amateur radio, before you burst into print with a lot of inaccurate comments. Perhaps it is merely ignorance. If so listen and learn.

Yours respectfully,

Syd Molen VK2SG
First AMTOR Station in Australia,
Over 40 years on the Air,
13 Pendle Way,
Pendle Hill, NSW. 2145.

The above has been somewhat abbreviated and slightly censored. Syd's feelings have obviously been hurt! —Ed.

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DO YOU KNOW JOAN ELEANOR?

Do any readers have any details of the *Joan Eleanor* transmitter/receiver which was used by OSS agents operating inside Germany in 1944/45?

The OSS required a radio that could operate securely inside Germany as opposed to those used by agents in the occupied countries which were not secure and which required trained CW operators. Wireless sets used by these agents survived in reasonable numbers but *Joan Eleanor* would be very rare.

It was designed by Steve Simpson and De Witt Goddard, who were officers with the OSS in London and in civilian-life were engineers with RCA. Simpson named the radio *Joan Eleanor* after two friends.

The only details I have are its size — 6.5 x 2.25 x 1.5 inches and weighing three-quarters of a pound. Power was by 'long-life batteries and it had a speaker microphone. The beam antenna 'opened out to one foot' whatever that means.

It required an open space in which to operate, which in view of its very high operating frequency and QRPp, is understandable. The 'modus operandi' was to prearrange scheds as to time and place with a Mosquito aircraft equipped with a larger, higher powered version of the *Joan Eleanor* — and with a then novel device — a wire recorder on which contacts were recorded for transcription back to the UK.

Contacts were made via beams projected vertically from the ground and downwards from the plane flying at 35 000 feet. This beam covered a circle at ground level of 40 miles. Once contact was made the aircraft had to fly inside the beam pattern of the ground signal to maintain contact.

The system worked well in almost total security and a lot of important information was passed in this way but that is another story. I am interested in the technical aspect and would appreciate any information readers may have.

B Bailey VK5KBY,
44 Charlbury Road,
Medindie Gardens, SA. 5081.

ar

LONELY BACHELOR AMATEURS

Here is a recommended cure for lonely bachelor CW amateurs.

Tune in to UZ0FWF on 20 metres any morning around 2230-2300 UTC and you are sure to meet any, or all, of the following:

Helen, Eugenya, Natalia, Era, or Elena.

They alternate on the key.

This is, apparently, a YL Club, with the QTH being Korsakou, on Sakhalin Island, close to North Japan. All are nice girls and good CW operators. There is only one snag — all are very short on 88, in fact, they don't seem to have heard of such a thing!

"Mac" McBratney VK5YD,
PO Box 151,
Blackwood, SA. 5051.

ar

FOLLOW-UP PRACTICE

Further to the letter from P H Gibbs VK3AQ, in August 1986 edition of AR, I write to support his comments.

Amateur radio is open to all who comply with the licensing requirements — thus there will be amateurs who are technically competent and to whom home- brew is a breeze, and there will be amateurs who are less technically knowledgeable who need to be encouraged and educated.

The latter group need all the support they can reasonably be given within our fraternity.

Technical skills which are developed by home-brewing are one of the cornerstones of our hobby and have the potential to act as a national resource in time of trouble.

I would encourage Divisions and the Federal Executive to pursue the matter of follow-up practical construction sessions further.

Yours sincerely,

Stephen Phillips VK3JY,
37 Mangarra Road,
Canterbury, Vic. 3126.

ar

HAPPY WITH THE BLIP

Going through my old Air Force books I came across a poem by Corporal B F Cottam published on November 28, 1944 in *Wings*.

Those of us who were Wireless Mechanics at the time will appreciate the poem. Perhaps ex-Corporal Cottam is now an amateur!

Regards

Noel Abel VK3YUO,
49 Rowallan Avenue,
Harkway, Vic. 3806.

Happy with the Blip by Cpl B F Cottam

Hi! there "Troppo by the Swamp" and "Blanky by the Sea"
And "Goin' Troppo down the South" — you all just list to me.
You say, you're goin' troppo — that makes me ruddy laugh
You ain't struck nothin' yet, me lads — no fear, not ruddy 'arf.

Now I'm a happy Signals Mech — ain't you 'eard o' that remark?
No! I don't live at Taronga Zoo nor yet at Callan Park;
But I'm a guy what looks at blips and makes the ergs to flow,
And then goes nuts and happy mit a fine bright bluish glow.

Yes! I'm a guy what looks at things when things ain't even there,
And after when I'm off me shift I just sits still and stare.
Why! — Troppo! ! — Well! Gor strike me pink! it's just not in the race,
With a fellow that's in Signals with a bright blip-happy face.

Blip-happy! Lor', yer dreams of things that make a man fair sick,
You rant and rave and talk such rot they smites you mit a brick.
It's awful, blokes, it's crook, I says — so don't you winge no more
About your lot and what you do and things what makes yer sore.

'Cause a fella that's in Signals, he puts up with a lot
With ossifers and blips and things that drive him off his dot;
So please always remember — just take from me this tip,
Bein' troppo is a blessin' compared to "Happy with the Blip".

ar

HOW TO KILL OR BUILD AN ORGANISATION

When conditions on the amateur bands are bad or there is a sunspot minima as we have at present, Institute activity generally seems to decline. It is at these times when one hears complaints, rumours and other wild mutterings. It is a case of "idle hands get into mischief." This state of affairs is common with all organisations, and at some stage or other when a general stasis applies a glorious lassitude pervades the membership in their attitude towards their club or organisation.

It is similar with the WIA and it is now that members should be wary — they should be bestirring themselves to create interest and not kill it. The quickest way to "kill" any rehabilitation process is to adhere to the following ten rules (with apologies to the US magazine *Popular Gardening*):

1. Don't come to meetings, but if you do, come late.
2. Find fault with the officers and other members; particularly on the air.
3. Never accept office; it is easier to criticise than to do things.
4. Nevertheless, get annoyed if you aren't appointed to a committee.
5. If appointed, don't attend the committee meetings.
6. When asked to express your opinion, say nothing but afterwards tell everyone how things should be done.
7. When others roll up their sleeves to help, say the Institute is run by a clique.
8. Never write a magazine article; it is too much of a bore.
9. Hold back on your dues as long as possible, or don't pay at all.
10. Don't bother about getting new members, but if you do, be sure they are moaners like yourself.

Fortunately, we believe there are very few Organisation Killers amongst us, but in times of inactivity, beware. The Organisation Killer is an insidious disease and can become an epidemic.

We would like to believe that every member of the Institute was the direct antithesis of the OK, and it does not really take any great effort to become so. Beware of that feeling of complacency that advises there are plenty of others to do the work. There is always some job in the Division you can do, and to quote the old proverb — *Many hands make light work*. Too often too much is left to too few.

So we suggest that you offer your assistance to your Divisional Council and you will find them only too willing to accommodate you in some way; don't be shy about coming forward to help when assistance is required — you may find you may hold an important office yourself in the near future; become a real Organisation Builder and not a Killer.

—Written by the WIA Federal Executive, *Amateur Radio* May 1964

ERRATA

"Practical Earth Resistance Measurements" by George Cranby VK3GI (July, p 10).

The author has asked us to make clear a number of points which, partly due to initial ambiguity and partly to editorial changes, are not quite as intended.

1. He makes no claim to have measured ground or soil *conductivity*, which is characteristic of a soil sample itself an independent of the electrode system. He *has* measured earth rod *resistances* in different kinds of soils.
2. In the sentence beginning "This effectively negated . . ." it would be better to continue ". . . earth leakage as a factor in the HV system protection."
3. Additionally, there was a typographic error in the last line associated with Figure 1. The dividing line was omitted and the denominator (2) was misplaced. It should have been

$$Rx = \frac{R_1 + R_2 - R_3}{2}$$

Silent Keys

It is with deep regret we record the passing of —

MR LES BROWN	VK3ARL
MR HARRY BUCKLEY	VK6HB
MR BILL DONOVAN	VK4AKV
MR JACK HARGREAVES	VK2DUL
MR LEN VELLA	VK6AVL
MR G WEDDELL	L20383

Obituaries

HARRY BUCKLEY VK6HB

I wish to advise, with regret, that my brother, Harry passed away on July 16, 1986, after a long illness. He was 67 years of age and a bachelor.

He worked, until he retired, with the Department of Civil Aviation in Perth.

During the war years, Harry served with the Z Force in Queensland, but his whole life revolved around electronics.

In his younger days he had been active in all sports — cricket, football, golf, surf-skiing and even archery.

O Hamilton
ar

JACK HARGREAVES VK2DUL

The death occurred at his home at Tumut on June 22, 1986 of Jack, in his 79th year.

Although he had been in hospital on occasions during the previous few months, his death was sudden and unexpected.

He was born in Sydney on January 8, 1907 and spent his life in the Tumut district. Being a bachelor, Jack was a kind and devoted uncle to his four nieces and five nephews.

Jack was a foundation member of the Tumut and District ARC. His great love was radio and in 1982, after much study, he gained his full call. A significant achievement at 75 years of age. Jack's happy and cheerful disposition will be sadly missed at club meetings, as will his voice on the *Kookaburra Net*.

Jack is survived by his brother Arthur, of Sydney. To him and his family and relatives, deepest sympathy is extended.

—Vince Nugent VK2ALZ
ar

LEN VELLA VK6AVL

It is sad to report the sudden passing of Len on Australia Day, January 26, 1986, at York, Western Australia, at the young age of 63.

Len was born at St Julians, Malta on July 31, 1922. He joined the Cable and Wireless Ltd in 1940. In Australia he worked for the Overseas Telecommunication Commission.

He retired from OTC in 1982 after serving at Cocos Island, Fanning Island, Guam, Cairns, Sydney and Perth, and immersed himself in his hobby farm at York, Western Australia.

Len attained his amateur radio licence in 1981, and was a member of the WIA, AARTG and was Communications Officer for the local State Emergency Service in York.

He joined the Maltese Amateur Radio International Society and became a very active member with its International Network.

Len was married with four children.

I first met Len on July 12, 1954 whilst boarding a ship in Malta for the voyage to Australia. He was the Welfare Officer for the trip from Malta to Perth and he disembarked at Fremantle. Over the years we lost track of one another until we made contact on the air in 1981. I was then fortunate to renew acquaintances with Len and his wife, Leonie, when I visited Western Australia during a Round-Australia trip in April 1985.

To Len's wife and children, the Maltese Amateur Radio fraternity world-wide extend their deepest sympathy.

Sam Galea VK2AKP/9H1GS
MARIS Area Director Oceania
ar

BILL DONOVAN VK4AKV

It is with great sadness that I record the loss of my friend, and the friend of many, Bill Donovan VK4AKV, who passed away very suddenly at his home on July 6, 1986.

I first met Bill some 23 years ago as a new call, VK4ZBD, on two metres, but I could not foresee then the many enjoyable hours I would spend rag- chewing with this fine amateur.

Although he did not come into the amateur field until relatively late in life, he did so with great activity, but still found time to do duties with the WIA, Brisbane VHF Group and the Brisbane North Radio Club. The latter seeing fit to honour him with a life membership for his services as President and Class Manager, in which office he helped many to obtain their calls.

He was always ready to give a helping hand and greatly assisted at many antenna raisings and servicings.

No matter how crowded our bands may be in the years to come, I have no doubt that many will find there will always be a large blank space that occurred when Bill went Silent Key.

F Pettiford VK4ZAA
ar

THOUGHT FOR THE MONTH

It is never too late to be what you might have been.

W.I.A. WINDBREAKERS

— Warm and Machine Washable

— Navy Blue with 8 cm (3") WIA Badge

— Sizes 12-24

INQUIRE NOW AT YOUR DIVISIONAL BOOKSHOP.

QSP

AMATEUR RADIO — What it's all about

Amateur radio is the use of radio communications in all its forms as a hobby. There is in excess of 16 000 licenced operators in Australia and about one million internationally.

What is the difference between amateur radio and CB?

There is a great difference between the two: CB radio gives reliable communication for a limited radius with many restrictions on the type of equipment used whereas a licenced amateur operator can operate with a wide range of equipment including television and radio-teletype with much more power levels on up to 20 different bands from broadcast stations to microwave frequencies.

How far will you get with amateur radio?

Different bands have different ranges at various times of the day, the operators consider how far and when they wish to communicate and select an appropriate band to transmit on. In this fashion fairly reliable contact can be made to anywhere in the world.

Must you have a big antenna to operate?

Not necessarily, antennas come in all shapes and sizes for any given band, though a good rule is the higher the frequency you operate the smaller the antenna becomes and the less range you have. For most overseas communication large rotatable antennas are used as they give the ultimate performance but simple single wire antennas are quite effective.

What else can you do with amateur radio other than talk?

Talking to other operators is only one aspect of the hobby, operators are permitted to experiment with and construct their own equipment in many fields. Some examples are:

RADIO TELETYPE: Usually called RTTY, this mode allows communication by the typewriter keyboard using readily available ex-commercial telex machines.

AMATEUR TELEVISION: The transmission of colour or black and white television, both direct and via repeaters is an increasingly popular pastime.

SLOW SCAN TELEVISION: Allows one to transmit and receive pictures on black and white or colour from around the world.

REPEATERS: For operators on the road, a system of over 100 repeaters on mountain tops across Australia receive and re-transmit signals to greatly extend the range of mobile operations.

QSL CARDS: Upon making contact with distant or rare stations, it is customary to acknowledge contact by sending a personalised type of post card called a QSL card. Many operators make a hobby of collecting these cards from all over the world. These can be sent through the Wireless Institute of Australia's Divisional QSL Bureaus at moderate or no cost to members.

How do you become an amateur operator?

To become an operator you must obtain a licence from the Department of Communications by passing a combination of radio theory, regulations and Morse Code examinations dependent upon which of three classes of licence you wish to obtain — either Novice, Limited or Full.

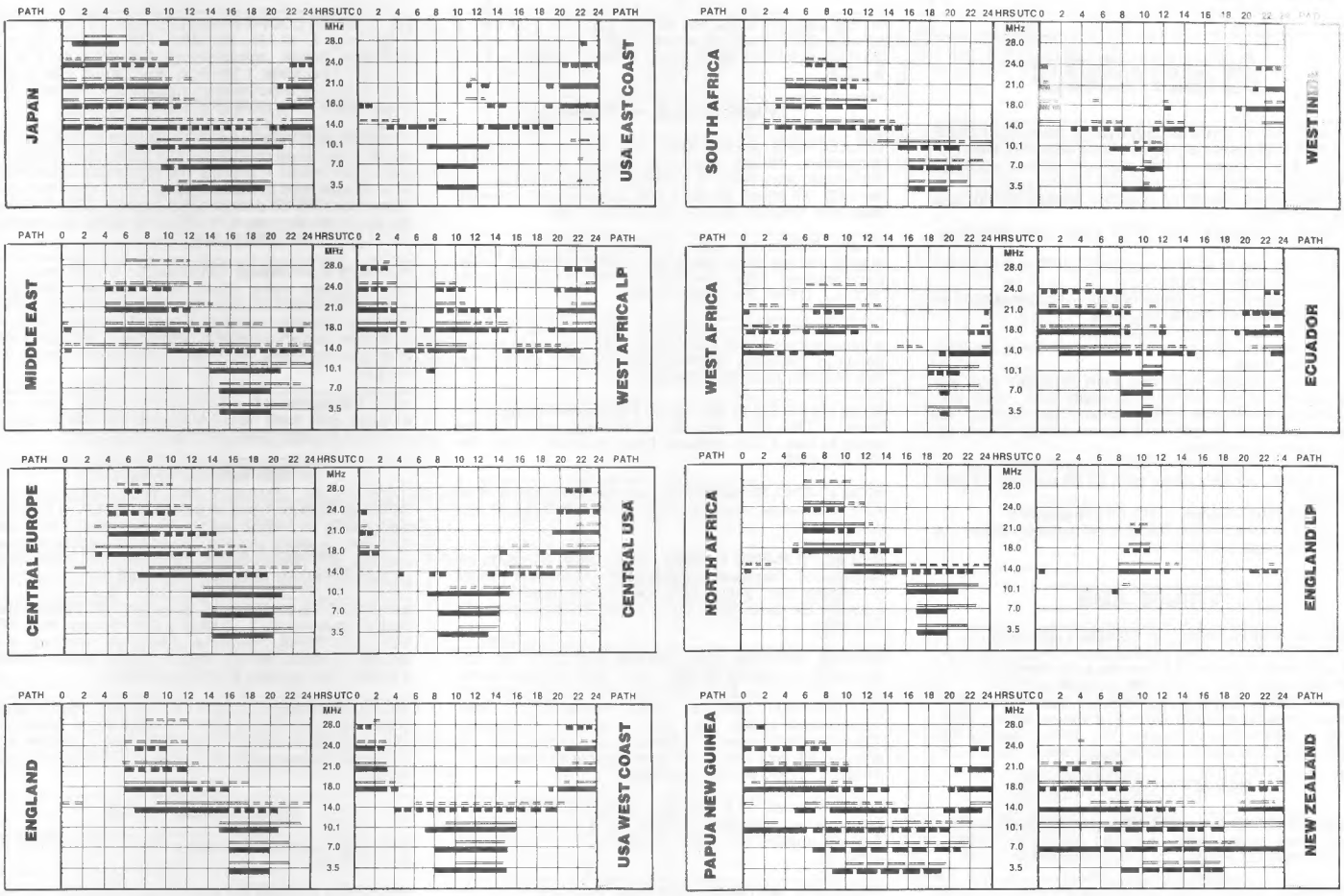
Examinations are conducted by the Department every three months. There are many courses run by the WIA, clubs and schools to assist with this. For details, contact the Department of Communications, the WIA, or your local radio club. Correspondence classes are also conducted by the WIA.

Once established, the amateur can play as active a part in the hobby as desired. There is no way of knowing where this exciting pastime may lead!

—Adapted from material supplied by the *Gippsland Gate Radio and Electronics Club*

Ionospheric Predictions

Len Poynter VK3BYE
14 Esther Court, Fawkner, Vic. 3060



LEGEND

From Western Australia (Perth)

From Eastern Australia (Canberra)

Mixed mode dependent on angle of radiation (long broken lines).

Better than 50% of the month, but not every day (continuous lines)

All paths unless otherwise indicated; (ie LP = Long Path) are Short Path.

Less than 50% of the month (short broken lines).

Predictions are presented courtesy of the Department of Science, IPS Radio and Space Services, Sydney.

FEES RISE

Radio communication licence fees increased from October 1, 1986 by an average of between seven and 10 percent, but in some instances, fees have been reduced.

The Department of Communications (DOC) in its Federal Budget Press Statements said the 16 300 licenses in the amateur radio service, under the single listing of "Amateur Station" increased $3 to $26.

CB licenses, which number 175 799 are now $13 — an increase of $1.

Revenue derived from the use of the spectrum is estimated at $33.161 million — which compared with DOC's total 1986/87 budget of $36.9 million, an increase of $4.1 million or 12.5 percent.

The Minister for Communications, said a shortage of frequencies for land mobile services in Melbourne and Sydney meant that new applicants for use of mobile frequencies in these cities would either have to share a channel or pay a fee of $2,130 for exclusive channel use. This will encourage the sharing of channels and other spectrum efficient practices.

Full details of the new fee structure are available from DOC Offices in all State capitals and District Radio Inspector's Offices in 20 regional centres.

—Submitted by Jim Linton VK3PC

Solar Geophysical Summary

JUNE

SOLAR

The solar activity was very low with no energetic flares observed. The visible disc of the sun was virtually without spots for the entire month, only small spots appearing for brief periods on the first and eighth. The low level of solar activity was reflected in the low value of the 10 cm flux, which reached a peak value of 70 on the 14th. The monthly average of the 10 cm flux was the lowest since the last solar minimum.

The 10 cm flux readings were:
1=69; 2,3=68; 4,5=67; 6-8=68; 9=69; 10-13=68; 14=70; 15,16=69; 17,18=68; 19-21=67; 22=68; 23=67; 24-30=66.

The average was 67.5.

The sunspot average was 0.8 and the running yearly average centred on December 85 was 15.4.

GEOMAGNETIC

The month was generally quiet except for the period 27-28 when a minor storm occurred. This was caused either by a recurrence or was the result of a filament eruption on 22nd. A=27,21.

—From data supplied by *Department of Science IPS Radio and Space Services* — June 1986.

DEADLINE

All copy for inclusion in the December 1986 issue of Amateur Radio, including regular columns and Hamads, must arrive at PO Box 300, Caulfield South, Vic. 3162, at the latest, by 9am, 20th October 1986.

HAMADS are a FREE service to MEMBERS of the WIA

Hamads

PLEASE NOTE: *If you are advertising items FOR SALE and WANTED please write **each on a separate sheet of paper,** and include all details; eg Name, Address, Telephone Number, on both sheets. Please write copy for your Hamad as clearly as possible. Please do not use scraps of paper.*

* Please remember your STD code with telephone numbers
* Eight lines free to all WIA members. $9.00 per 10 words minimum for non- members
* Copy in typescript, or block letters — double-spaced to **Box 300, Caulfield South, Vic. 3162**
* Repeats may be charged at full rates
* QTHR means address is correct as set out in the WIA current Call Book

Ordinary Hamads submitted from members who are deemed to be in the general electronics retail and wholesale distributive trades should be certified as referring only to private articles not being re-sold for merchandising purposes.

Conditions for commercial advertising are as follows:

$22.50 for four lines, plus $2.00 per line (or part thereof)

Minimum charge — $22.50 pre-payable

Copy is required by the Deadline as indicated below the indexes on page 1 of each issue.

TRADE ADS

AMIDON FERROMAGNETIC CORES: Large range for all receiver and Transmitting Applications. For data and price list send 105x 220mm SASE to: **RJ & US IMPORTS,** Box 157, Mortdale, NSW. 2223. (No inquiries at office . . . 11 Macken Street, Oakley). Agencies at: Geoff Wood Electronics, Lane Cove, NSW. Webb Electronics, Albury, NSW. Truscott Electronics, Croydon, Vic. Willis Trading Co, Perth, WA. Electronic Components, Fishwick, Plaza. ACT.

WANTED — NSW

BLUE COVERED WILLIAM ORR RADIO HANDBOOK. Prop- Pitch motor. Valve bases for 813. Tcvr TS-820S. Maurie VK2DCD, PO Box 72, Coleambally, NSW. 2707.

KENWOOD AT-120 ATU: for mobile installation. Cress VK2CC, QTHR. Ph: (02) 631 3186.

ROLLER INDUCTOR: 30 μH; in good condition. Philip VK2EPC, QTHR. Ph: (02) 660 6734.

UTILITY X BEAM HUB CASTING: one wanted by VK2ALZ, QTHR. Ph: (069) 47 2198.

YAESU FT-780R: 70 cm all-mode or equivalent. Good price paid. Also 500 W antenna tuner wanted. Larry. Ph: (02) 949 3124.

WANTED — VIC

FRG-7000; FRG-7700; KENWOOD R1000/R2000; REALISTIC DX 400 (not 302); ICOM IC R70: Any of the above to swap for complete CB station in very good condition. See sale ad Vic. John L30479. Ph: (058) 21 0846 AH.

INVITATION: to Clubs or Groups to supply details of their history, aims, activities & services so as a Club Portrait can be written as part of a series of profile articles in AR magazine. Please post information, including a contact name & phone number to Jim Linton VK3PC, QTHR.

KENWOOD MC-50 DESK MICROPHONE: Contact VK3OM, QTHR. Ph: (03) 560 9215.

STURDY METAL TRIPOD: capable of holding antenna pole for small beam. 6m linear, (home-brew will do) & wind generator 12V suitable for portable use. Also neon sign transformer in working order. Ken VK3AJU. Ph: (03) 527 9029 or (03) 857 8054.

WANTED — QLD

ONE 690R: including or excluding matching PA. VK4JHM, PO Box 849, Atherton, Qld. 4883. Ph: (070) 91 3219.

INFORMATION: to put a SSB SBE-IV 23 channel CB onto 10 metres. Bill VK4VHD, QTHR. Ph: (074) 22 2695.

WANTED — SA

YAESU FT290R: 2m all-mode tcvr. Must be in mint condition. Ivan VK5QV, QTHR. Ph: (087) 25 5514.

FOR SALE — ACT

70 cm LINEAR CORONA HP-120 UDX: with GaAsFET preamp. $550. Toyko HP power 70 cm GaAsFET low noise mast-head preamp. $260. Ralph VK1RK, QTHR. Ph: (062) 81 0203.

FOR SALE — NSW

COLLECTORS ITEM: Radio & Hobbies in Australia magazines. Bound into year books for 1953-1954; 1955-1956. Also Radio & Television Hobbies in Australia for 1959. All bound for each year, comprising 5 volumes. Best offer. VK2URT, QTHR. Ph: (043) 41 7693.

FT-200 TCVR: no mods, good condition. H/B power supply, manual, some spare tubes. $200. Model 15 TPTR. Exc condition. 110V xfrmr $25. ST5 RTTY terminal. $25. VK2ALZ, QTHR. Ph: (069) 47 2198.

ICOM IC-740: FM module fitted. WARC bands & PS-15 original supply. Hand mic & desk scan mic. All in perfect condition. Manuals. $1090 ONO. VK2BPO, QTHR. Ph: (02) 713 1831 AH or (02) 568 2085 BH.

ICOM 740 HF TCVR: $650. Icom PS15 power supply. $110. Yaesu FC700 ATU. $95. Icom SM2 desk mic. $30. All equip as new & with manuals. Peter VK2DEH, QTHR. Ph: (02) 452 4302.

ICOM IC-R71A RX WITH FM: Dressler active ant. Emtron ATU, microwave modules, 2 & 6m converters. $1100. Ph: (049) 69 4281.

KENWOOD R-2000 COMMS RX: ex cond. No mods, no faults. $560. Kenwood TS-7850, 50W FM 2m tcvr. Approx 6 months old. $550. MFJ-1224 RTTY modem. Suit Com.64. Ex cond. $260 ONO. Steve VK2KSR. Ph: (02) 709 2826.

PEARCE SIMPSON AM; SSB; CB: with power mic plus handbook to modify to 10m band. $85. Midland home-base port & mobile 23 ch CB. Very compact (AM) $65. AM/FM broadcast band rx. AWA model ST.06. $80. Thumbwheel switch. C&K type. 3 wheels, 9 positions. $20. 50W SWR meter $70. Arlec power supply. 13.8V, 2A. $85. Ext RF amp with 20 dB gain suitable for novice. $40. VK2CJV, QTHR. Ph: (02) 809 5024.

QUAD: 2-bands, 10 & 15M, 2 el. Wooden cross arms, wire elements, no matching devices. On a 6' tubular boom. Buyer to remove. $40 ONO. VK2AXT, QTHR. Ph: (02) 635 4384.

SATELLITE ANTENNA SYSTEM: 2m, 2 x 8 el. Incl phasing harness, left or right-hand circ polarisation. 70 cm, 2 x 14 el. Incl phasing harness, left or right-hand circ polarisation. Fibreglass stacking boom. $450. VK2BKQ, QTHR. Ph: (02) 848 8781.

TRIBAND BEAM CE-35LX: still in box, new. $320. CW auto keyer $15. 2m conv. $25. HF linear amp; suit FT7. $220. O/D telephones $25. Valves; tx & rx all types. WWII mine detector $60. All items ONO. All types books; AR, 73, CQ best offer. Ph: (043) 96 4553.

YAESU FT-ONE & TUNER: both in perfect condition. Tcvr complete with optional filters, RAM & FM board, one desk & one hand mic. Complete with all manuals in original packing. Prefer to sell units together. Asking $2575 with 20m coax thrown in. Suit new buyer. Matthew Ryan, St Francis' College, Leeton, NSW. 2705. Ph: (069) 53 3622.

YAESU FT-707 TCVR: WARC bands. Mint condition. Unmarked in original carton with manuals. Fitted with narrow CW filter. Yaesu YM-35 microphone. Yaesu FC-707 antenna tuner, also in mint condition. $770 the lot. Kenwood VB-2530, 2m 25W FM amplifier as new. $85. VK2TAM, QTHR. Ph: (02) 871 4826 AH or weekends.

FOR SALE — VIC

AUDIBLE SWR METER: cost $87; never used, $50. Icom 490A, 70 cm. $600. Used twice. VK3WX, QTHR. Ph: (03) 25 6340.

COLLECTORS BOOKS: ARRL Handbooks, 1945, 1947, 1951, 1959 $10 each. Command sets. 1957 $5. Fundamentals of SSB, Collins. 1960 $5. RCA transmitting tubes. 1938. $4. Icom IC-25A 2m FM. 25W op 2 VFOs, 5 memories. With instr book & complete workshop manual. In good working order. $300. VK3OM, QTHR. Ph: (03) 560 9215.

COMPLETE (ALMOST) SET of R&H RTV&H EA: 1950 to 1980. 3 missing. Some bound. Offers. Geoff VK3ACZ. Ph: (050) 24 5987.

COMPUTER: TRS-80 coco 64k extended Basic. Some cassette software, including Logbook. Original packing. Ex cond. Les VK3PYD, QTHR. Ph: (050) 24 1361.

HEATH SB-230 LINEAR AMPLIFIER: 80 to 10m at 1 kW input with Eimac 8873 final. Very little use & in excellent condition. Manual provided. $650. VK3IH, QTHR. Ph: (03) 584 1610.

HF COMPACT LOOP-TYPE ANTENNA: TET model QPL-4 covering 7, 14, 21, 28 MHz. For anyone living in apartment house, condominium flat or unit. Fits on handrail. 1.7m wide, 1.2m high. Purchased new & only used to test, but unsuitable for my location. Half price $75. Doug VK3VXY. Ph: (059) 75 5024.

GENERAL ELECTRIC: AM/SSB 40 channel CB. Current model in very good condition. $200. Oskerblock SWR-200 SWR/PWR meter. 4 months old in excellent condition. $100. Werner Wulf 11 metre vertical. Good condition. $40. 13 metres of RG 8U coaxial cable & plugs. $20. Will swap the above for shortwave rx of similar price & condition. John L30479. Ph: (058) 21 0846 AH.

PLESSEY CARTRIDGE MACHINES: 2 only model no CPM-2. Needs some attention. Hills dual polarisation antenna, model FCIC, Tuned to 91.5 MHz. Otari reel-to-reel tape recorder (working). Needs new power lead. All equipment is ex-radio station equipment. No reasonable offer refused. David VK3KGF. Ph: 743 6866 BH or 743 6992 AH.

YAESU EQUIPMENT: FT101ZD tcvr. $850. Desk mic, YD844A. $55. Both items & manual for tcvr in perfect condition. L31285, QTHR. Ph: (03) 29 4314.

FOR SALE — QLD

COLLINS 75S1 rx: fitted with additional 800 Hz CW filter. Collins 32S1 tx, 516H-2 pwr supply. All units in very clean condition & good working order. Instruction manuals included. Will ship at buyers expense. Total price. $650. VK4VK, QTHR. Ph: (075) 38 7152 after 6 pm.

KENWOOD TS-820S TCVR: S/no 740948. Fitted "Ham Radio" mods for 10 & 18 MHz & CW netting. With VFO 820 S/no 750499. Service & operating manuals, mod details, 3 spare valves, mic & leads. $500. Dennis VK4ADY. Tin Can Bay. Ph: (071) 86 4492.

YAESU EQUIPMENT: FT200 HF tcvr with match power supply. 80- 10m SSB & CW including mic & handbook. Mint cond $250. FRG7700 rx. 0-30 MHz compete with handbook. As new. $425. Ron VK4EV, QTHR. Ph: (07) 355 4308.

FOR SALE — SA

COLLINS 75A4 RX: with spare tubes. $125. VK5BS. Ph: (08) 295 3249.

KENWOOD TS-120V HF SSB TRANSCEIVER: Unused. $400. Ph: (08) 383 0071.

RADIO TUBES: 4-65A; QE3-300; 829B & socket; 815; (4E27/8001) VCR139. Two sets tubes KW 2000. AM tx 160m-50 MHz. Old BC radios (working). 150 various tubes. VK5LC. Ph: (08) 271 6841.

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October Australian Electronics Monthly with Elektor Electronics incorporated!

We believe one of the fundamental roles of an electronics magazine is to provide ***brain fodder*** for enthusiasts and engineers, hobbyists and hardware hackers, amateurs and audiophiles.

Practical projects and articles that stimulate the mental 'taste buds' and satisfy the cranial cravings, are ever in demand.

Our reader survey showed that you purchase a wide range of magazines each month, seeking ever more brain fodder. By far the most popular and widely respected of the international journals was ***Elektor Electronics.***

Hence, to bring you more brain fodder, we obtained the rights to publish a substantial part, of local relevance, from the monthly issues of the UK edition of Elektor Electronics.

From the October issue, we'll be adding to the magazine a special ELEKTOR ELECTRONICS SECTION featuring:

- More projects! From one of the world's most widely read and respected electronics magazines.
- More features! To explain the new technologies and developments as they arrive.
- More articles! Covering the technologies and application techniques of devices and circuits.

Will components be checked for local availability?

Yes. Prior to publication we will seek out sources of component supply where necessary and/or suggest suitable substitutes.

Will project pc boards be available?

Yes. We will be making pc boards available for the Elektor projects we publish through our normal PC Board Service, along with our own project pc boards as usual.

Is it going to cost more?

Yes it will. From October, our cover price will be $4.75.

But, if you already buy Elektor and AEM, as we know many do, instead of paying $8.05 total, you'll get BOTH magazines for the price you were paying for Elektor alone! If you're the sort of reader who buys those magazines which have contents of interest to you that month, now you'll get more for your money AND spend less!

HERE'S A PREVIEW OF OCTOBER'S ELEKTOR SECTION

INDUCTORS IN PRACTICE

In spite of their apparent simplicity, inductors none the less often pose problems, because invariably they cannot be obtained ready-made, i.e. they have to be designed and wound by the constructor. This article aims at removing some of the obscurities surrounding this subject and showing that making an inductor is not such a daunting task as some think.

LOUDSPEAKER IMPEDANCE METER

A simple, yet interesting and useful, instrument for measuring the resistance and the inductive reactance of a loudspeaker.

UNIVERSAL PERIPHERAL EQUIPMENT:

SERIAL DIGITIZER

Have you ever wished it were possible to read analogue voltages on your computer while sighing in dismay at the intricacies of bus connecting the design of your choice?

This design of an eight-channel analogue-to-digital converter board goes round the hardware problems by utilizing the computer's serial IO port, and so becomes a universal unit for straightforward incorporation in almost any type of computer system.

Australian Electronics Monthly
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Cnr Fox Valley Rd & Kiogle St. Wahroonga 2076 NSW

More BRAIN FODDER

— with Elektor Electronics incorporated in Australian Electronics Monthly — coming October!

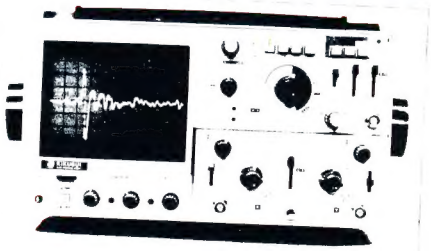
LOUDSPEAKER IMPEDANCE METER

A simple, yet interesting and useful, instrument for measuring the resistance and the inductive reactance of a loudspeaker.

UNIVERSAL PERIPHERAL EQUIPMENT: SERIAL DIGITIZER

Have you ever wished it were possible to read analogue voltages on your computer while sighing in dismay at the intricacies of bus connecting the design of your choice?
This design of an eight-channel analogue-to-digital converter board goes round the hardware problems by utilizing the computer's serial IO port, and so becomes a universal unit for straightforward incorporation in almost any type of computer system.

STORAGE OSCILLOSCOPES



Conventional (real-time) oscilloscopes cannot capture very slow signals, such as, for instance, the charging curve of a battery or the sawtooth waveform of an AF wobbulator. Nor can they cope with infrequent events, such as noise pulses. They also do not allow a comparison to be made of events that happen at different times. All these drawbacks are absent from storage oscilloscopes.

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- More articles! Covering the technologies and application techniques of devices and circuits.

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CooperTools

THE PRIZE

A transformer powered soldering station, complete with a low voltage, temperature controlled soldering pencil. The special Weller "closed loop" method of controlling maximum tip temperature is employed, thereby protecting temperature sensitive components, while the grounded tip and non inductive heater protects voltage and current sensitive components. The soldering pencil features stainless steel heater construction, a non burning silicon rubber cord and a large selection of iron plated tips in sizes from .8 mm diameter to 6 mm diameter with a choice of tip temperature of 315°C (600°F), 370°C (700°F) and 430°C (800°F). The transformer case features impact resistant noryl for durability and protection against accidental damage, a quick connect/disconnect plug for the soldering iron, extra large wiping sponge, tip tray to store extra tips, plus an improved off-on switch with a long life neon indicator light, a non-heat sinking soldering pencil holder, and a 2 m flexible 3 wire cord.

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